FEBRUARY
JULY
MARCH
JUNE
SEPTEMBER
DECEMBER
1957
CHICAGO NATURAL HISTORY MUSEUM Bulletin
Vol. 28 No. 1
January 1957
NOVEMBER
JANUARY
OCTOBER
MAY
APRIL
AUGUST

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Chicago Natural History Museum

FOUNDED BY MARSHALL FIELD, 1893

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Members are requested to inform the Museum promptly of changes of address.

THIS MONTH'S COVER— A HAPPY NEW YEAR!

"AROUND THE CALENDAR" is a common term although the calendars that most people are familiar with usually come in square or oblong form. On our cover, however, we have a 1957 calendar that actually goes around, depicting some of the events scheduled during the year at the Museum. Time spins so fast, in fact, that the months trip one over the other, and, when brought to rest in our montage of photographs of Museum seasonal activities, they have been shifted out of their chronological order. Imposed by the necessities of pictorial composition, this scattering of dates also symbolizes the way the press of events sometimes feels to those concerned with carrying out plans.

Here is a key to what the pictures on the cover represent:

January—Color on Wings. Special exhibit: Venezuelan birds in paintings by Kathleen Deery de Phelps of Caracas. Through January 27.

February—Lenses on Nature. 12th Chicago International Exhibition of Nature Photography (Nature Camera Club of Chicago), February 2–24. Photo on cover by J. Musser Miller of La Grange, Ill., a frequent exhibitor and winner.

March—Armchair Travel Season. Opening of Spring Series of Ayer Film-Lectures on Saturday afternoons (continuing through April). Photo shows Fred Machetanz, explorer who has lectured here on the Far North. *An Autumn Series of travel lectures is given on Saturday afternoons in October and November.* Concurrently with both Spring and Autumn adult lectures the Raymond Foundation presents free movies on Saturday mornings for children.

April—Blossom Time. Special exhibit: Paintings of cultivated flowering plants by Miss Ethelynde Smith of Altadena, California.

May—Artists of Tomorrow. Special exhibit: Drawings by students in classes conducted at this Museum by the School of the Art Institute. Photo on cover shows part of group-project mural exhibited last year by Junior School students.

June—Gems and Jewelry. 7th Annual Amateur Competitive Exhibition of Chicago Lapidary Club. Photo shows ring and necklace exhibited in the past.

July—People of Pacific and Caribbean. Ethnological portraits of people in Indonesia and Central America, painted by Miss Elisabeth Telling of Guilford, Conn. First showing of this gift to the Museum. (A summer series of free movies for children will be given on Thursday mornings from July 11 to August 15 inclusive.)

August—The Big Dig. Museum expeditions will be at their height in this season. Photo on cover shows excavation by Southwest Archaeological Expedition, which will be in its 23rd season in 1957. Other Museum expeditions will be working in many parts of the world.

September—Their Biggest Classroom. Schools reopen this month for children seen entering the Museum and millions of others, but all year round the Museum contributes to their education. During the school-year thousands of organized groups accompanied by teachers come from all over Middle West.

October—Open House. Members' Night occurs in this month, and our guests are admitted to the mysteries behind the scenes. In photo, Dioramist Lee Rowell is shown explaining one phase of Museum work to a group of visitors at last year's event.

November—America's Bountiful Crops. Special exhibit for Thanksgiving: Food Plants of New World Origin.

December—The Holiday Season. A chipmunk hibernating—part of a special exhibit in the Museum showing what animals do in winter.

Through the Year many other special attractions will be presented. Attention is especially called to the Museum Journeys for Children presented by the Raymond Foundation in January, March–April, July–August, October–November, and December.

And so the personnel of the Museum extends wishes for a Happy New Year to all of the thousands on its Membership Rolls.

STAFF NOTES

Dr. Theodore Just, Chief Curator of Botany, and **Dr. Karl P. Schmidt,** Curator Emeritus of Zoology, attended the meetings in December in Washington, D.C., of the *ad hoc* Committee on Systematic Biology sponsored on behalf of the National Science Foundation by the American Institute of Biological Sciences .... **Dr. Julian A. Steyermark,** Curator of the Phanerogamic Herbarium, recently lectured on his experiences in exploring the "lost world" of Venezuela before the Chicago Dental Society, the Men's Garden Club of Highland Park, and the Downers Grove Men's Garden Club .... **Dr. Robert H. Denison,** Curator of Fossil Fishes, attended the meetings in December in New York of the Society of Vertebrate Paleontology and the Society for the Study of Evolution .... **Loren P. Woods,** Curator of Fishes, has returned after several weeks on a research project at California institutions including the museums of the University of California (Los Angeles), Leland Stanford University, the Hancock Foundation, Scripps Institution, and California Academy of Sciences.

Gift From Curator Gerhard

William J. Gerhard, Curator Emeritus, Insects, has given the Museum his reprint library of approximately 2,300 papers on the Hemiptera-Homoptera or true bugs. This notable donation supplements the collection of true bugs and library of separate works on these insects that Mr. Gerhard gave to the Museum several years ago.

WOODPECKERS AS SOURCE OF INSURANCE CLAIMS

By AUSTIN L. RAND
CHIEF CURATOR OF ZOOLOGY

RECENTLY a telephone call came to the Museum's Division of Birds from an insurance adjuster. An insured party was trying to recover for woodpecker damage to his home. The adjuster had not yet seen the house, but from the account he'd heard, it was badly damaged. The insured party, anticipating difficulty in collecting, was anxious to have woodpecker-damage coverage for next year. "What were the chances of continuing damage next year?" the adjuster wanted to know, "Will the parents and the young woodpeckers all come back and continue eating on the house until it's wrecked?"

Naturally, estimating insurance risks is out of our line but woodpecker habits are not; so we provided woodpecker information. Woodpeckers, properly speaking, do not eat

Cartoon by Ruth Andris

wood but rather feed by chiseling into wood in search of wood-boring insects. They also excavate nest sites and sleeping places in solid wood, usually in a tree.

FINE EXAMPLES OF PERSISTENCY

It is extremely improbable that any house about Chicago would have insects enough in its walls to attract a woodpecker year after year. Any chiseling into houses would probably be for a nest or sleeping place. Woodpeckers have been known to drill holes through the walls of buildings, and a flicker once made a hole through the wall of a barn into the hay inside where it made its nest. But most times a hole through a wall would reveal a cavity quite unsuited for woodpeckers' use.

However, you can't count on a bird not doing something just because it's illogical. A pair of motmots, very distant relatives of the woodpeckers in Central America, drilled a hole through the mud wall of a house and came out into the house. Undismayed, the birds tried again and again until there were several holes in a row under the eaves right through the wall and the birds still had no nest.

As to the birds bringing their young back next year to the same house, that is contrary to woodpeckers' custom. When the young become full-grown and independent, sometime in the summer, they usually scatter out. Many live solitary lives all winter, when they chisel out sleeping homes for themselves. In the spring each pair of woodpeckers stakes out a territory for itself from which it excludes others of its kind.

It is not only by chiseling out wood that woodpeckers cause annoyance to householders, but the tapping they do on houses sometimes disturbs timid folks. One morning last spring a telephone call came from a worried lady whose baby was being kept awake by the drumming of a woodpecker outside the window. She wasn't at all satisfied by my assurance that the springtime mating, of which the drumming was a part, would soon be over and that the woodpecker with a mate and young of his own would soon be too busy raising a family to indulge in noisy tapping on her roof.

FEARS HAVE LITTLE BASIS

Trouble from spring drumming on and chiseling into houses must be very rare and damage slight. If we lived farther west, out on the edge of the prairie, the story might be slightly different, but here about Chicago there are lots of trees for woodpeckers to work on. I wonder if most of the concern we hear about in the Museum is not over what damage woodpeckers *may* do rather than what they do cause. May it not be the concern of newcomers from the city to suburban and country areas over trespassers that they cannot control or order off and that they fear may cause damage?

The people who do have trouble with woodpeckers are the people who have to maintain electric light and telephone poles in certain districts. I've heard of trouble from woodpeckers in Florida, in Wisconsin, and in Pennsylvania, but know of it best in Florida, where the rural electrification project has put lines of poles along scantily wooded country and on the prairies. The stout poles evidently seem to the woodpeckers better for their homes than any of the nearby dead tree-trunks, and they chisel out their nest cavities in them. Only a shell of wood is left around the cavity to support the pole and wires when the winds blow and when linemen have to climb. The cost of pole-replacement is sometimes considerable, but fortunately the research on this problem has turned not to ways of exterminating woodpeckers but to ways of making the poles woodpecker-repellent. Up to date the research has not produced an economically feasible answer, but it is still going on. Perhaps it will provide a synthetic pole that woodpeckers can't use and so will leave more tall trees in the forest.

TRIBUTE TO E. E. HAND, SHELL COLLECTOR

By FRITZ HAAS
CURATOR OF LOWER INVERTEBRATES

IN 1937 a man whose influence upon the scientific exploration of the Chicago region was never duly known and appreciated passed away in Long Beach, California. Now, almost twenty years after his death, he has become newly and inseparably associated with this city's scientific endeavors.

Edwin E. Hand

Edwin Ellsworth Hand, the distinguished man of whom I write, was born in Centralia, Illinois, on June 3, 1862. He graduated from Shurtleff College, Upper Alton, Illinois, and became a teacher. After serving as a school principal in Paducah, Kentucky, for some time, he came to Chicago where he taught, among other subjects, natural history at Wendell Phillips and Hyde Park high schools. During this Chicago period, Mr. Hand became an ardent student of malacology and collected in many Chicago-area localities that since have been swallowed by the ever-expanding city. He became a friend of James H. Ferriss of Joliet, Illinois, whose fine shell collection was turned over to Chicago Natural History Museum some years ago. With Ferriss, Hand made extensive collecting trips in the Joliet area as well as in the then almost unexplored western expanse of the United States. The fruits of these excursions are preserved in Hand's collection.

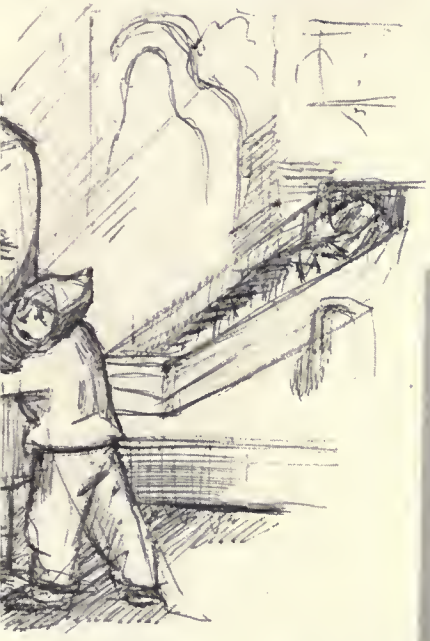
In later life, Mr. Hand and his family moved to Long Beach, where a new phase of his malacological career began. Formerly he had restricted himself almost entirely to the collecting of land and fresh-water mollusks, but in California his interest turned to marine shells. Both alone and in the company of Herbert N. Lowe, also of Long Beach, Hand collected these abundantly. A trip to Cuba with D. L. Emory of St. Petersburg, Florida, resulted in an excellent collection of shells and two short papers about them.

ADDED FOREIGN SPECIMENS

Not satisfied with his personal field-collecting activities, Mr. Hand also began to exchange shells with noted malacologists all over the world, notably with Philippe Dautzenberg of Paris. He thus added material from a wide range of foreign countries to his shell collection. He also often bought shells that attracted his attention, and as a result his collection is especially rich in perfect specimens of the

(*Continued on page 7, column 1*)

CORN
BOOK SHOP



MUSEUM VIEWS

.... and viewpoints

by MARION PAHL
MUSEUM ILLUSTRATOR

CLIMBING TO THE FLAMING CRATER OF IZALCO

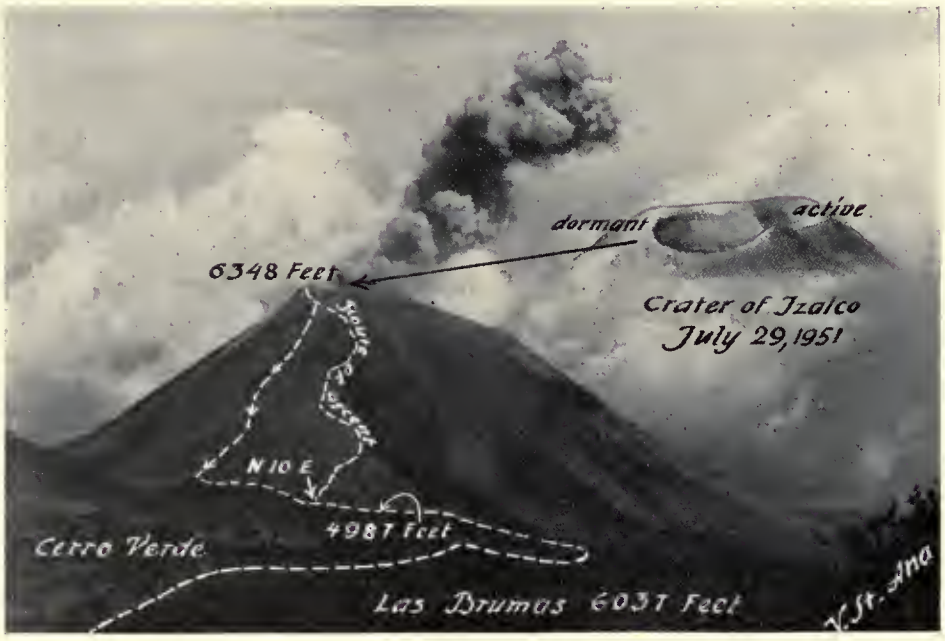
By SHARAT KUMAR ROY
CHIEF CURATOR OF GEOLOGY

A RECENT ARTICLE in the *New York Times* (December 8, 1956), under the heading "Erupting Volcano in Salvador Filmed Up Close by Scientists," reminded me of my participation in the climbing of the same volcano six years ago and prompted me to draft a letter to the editor as follows:

Dear Sir:

Referring to the opening paragraph of your report: "For the first time in memory, the active volcano of Izalco, in western Salvador, has been scaled and its flaming crater observed and photographed at close range," I may take the liberty to say that I scaled Izalco on July 29, 1951. The eruptive activity of the volcano, at that time, was very much the same as it is today except that there were fewer fumarolic areas around and below the crater-rim than today. This I know from personal experience. I have made numerous trips to Izalco since 1950. My last one was barely eight weeks ago, October 19, 1956. From what I observed then, I did not believe that it was physically possible to reach the crater, much less spend twenty minutes on its rim, as did Haroum Tazieff and his party. It appeared to me that the numerous steaming and glowing cracks all around the northeast-northwest side of the crater and its approaches created a temperature condition that no living being could withstand.

Only three years ago, my right foot broke through one of the lesser fumarolic areas of El Salvador (base of volcano San Vicente). Within a matter of seconds, notwithstanding shoes and socks, it was so severely burnt that I had to be carried away. I, therefore, believe that Tazieff and his five companions have accomplished a singular feat, all the more because the party climbed the volcano after midnight in the darkness of a waning last-quarter moon. I made my ascent from the northeast flank, N 10° E, shortly after sunrise, in broad daylight, which gave me the advantage of avoiding loose rocks and fumaroles. The going, especially the last 100 meters, became so steep that I had to sit down with my back to the volcano and push myself upward with my feet. It took me an hour and forty-five minutes to reach the edge of the dormant crater. There I stretched my neck over its rim and saw the active crater to my right—a hissing, swirling mass of black clouds tinged with flaming gases and spattering lava. It was a frightening spectacle and I was terrified. I turned and went down by a shorter route, a gully-like cut filled with pyroclastics of varying size. Izalco erupted once when I had covered about a fourth of the distance and twice during my descent, but I was far enough down then to enable me to avoid falling rocks except the ashes.



VOLCAN IZALCO IN WESTERN EL SALVADOR

Dr. Sharat K. Roy ascended this volcano, which is the most active in the Western Hemisphere, on July 29, 1951, by the route indicated above. On reaching the summit, he found two craters separated by a low wall. One of the craters was dormant, the other active. The latter was a frightening, bottomless pit in which swirled masses of black clouds, burning gases, and liquid lava that rose and fell and spattered.

It was a challenge that I wanted to take. I learned only a little, but I did see an active crater, the condition of which changes at frequent intervals. Once again I wish to express my admiration and congratulate Tazieff and the entire group for a well-nigh unparalleled achievement.

Very sincerely,
Sharat K. Roy
Chief Curator of Geology

In connection with my attempts to climb Izalco and my final success I wrote to the Director of the Museum from San Salvador on July 27, 1951:

Since writing to you last I have made three attempts to climb the Izalco, each time from a different direction with little success. Day before yesterday (Wednesday) I approached it from the southwest side under the protection of an adventitious cone and reached 4,830′, but that's all. Next Sunday I shall make my last attempt from the NE side. I am leaving tomorrow morning to spend the night at Las Brumas in a finca, which is about three miles from the base of the volcano, then start out to climb at dawn. I doubt if I shall make it; it is a formidable task. If the volcano were quiet, I wouldn't be so doubtful. She is throwing up all sorts of obnoxious junk, two or three times an hour, and it is impossible to predict where the debris will fall.

Sunday 9:30 p.m.

Well, Sir, I did it. Came back at about 6:15 P.M. and I have been talking to the fellows ever since. It's a grand and satisfying feeling. I made a trial climb as soon as I got to Las Brumas at about 3:15 P.M., and I knew then that I would do it, but I was so tense that I did not have a wink of sleep. In retrospect, it is not as formidable as I was given to understand, or as I myself thought it to be. I had a couple of bad moments, but that was to be expected and I was prepared for it. Only two real casualties: lost the barometer and my leather gloves that I inherited from Uncle Sam during my sojourn in Greenland, serving not in the Infantry, but the more envied U.S.A.A.F.!

I am really much too tired to write more about it. Actually, I did not have to scale it. I had all the essential data of the volcano. It's the mule in me that kept on urging me to have a peep into the crater.

It's raining harder than ever. The abandoned house at the finca where I slept last night had numerous pigeons cooing from the eaves of the tile roof; chickens and pigs coming in and out at will as a matter of curiosity; rats having their usual family reunions; and lastly, a dead pup was lying a couple of feet from my hammock. I did not know his state until morning. All these in one room, which did not have any window, but the door was kept open either for ventilation, or for the convenience of the guests I have just recounted.

With kind regards
Most sincerely,
Sharat

P.S. Rand [Dr. Austin Rand, Chief Curator of Zoology] will be interested in the

Izalco trip. We, rather I, used to pester him about it.

S.R.

The Director was away on vacation when my letter arrived. I received the following answer from the Deputy Director:

Muy Estimado Señor Doctor Roy:

Your letter to Colonel Gregg arrived after he had left on vacation at the end of the month. However, I shall send it on to him at Maple Knoll Farm, where he will be until the seventeenth of August. The news of your spectacular climb is spreading. Rand was delighted to learn of your accomplishment. From my point of view, living at the finca you describe was a greater feat than climbing Izalco! . . .

Sincerely,
John R. Millar
Deputy Director

E. E. HAND—

(*Continued from page 3*)

Japanese shell fauna that had become known to science in its fullness only in recent times through the efforts of that able and indefatigable collector, Yoichiro Hirase in Kyoto.

Miss LaVerne Hand, daughter of our collector, recently wrote me that her father was "a family man and seemed never happier than when arranging a group of shells for mounting in small boxes or watch cases." Indeed, a great portion of his collection was brilliantly arranged, the shells being displayed so well that they were safe from touch and yet all their interesting features as well as their intrinsic beauty were perfectly visible.

After Mr. Hand's death on March 30, 1937, his daughter brought the collection back to Chicago and stored it until, in the spring of 1956, she planned to move to Grant's Pass, Oregon. She then decided that Chicago Natural History Museum was the most logical place to assure the usefulness of her father's shells. Thus, through Miss Hand's perspicacity, this Museum has come into possession of an extremely rich and important collection.

A BIG JOB

When the forty large boxes containing the collection arrived in the Museum, a task of real magnitude began. The thousands and thousands of individual lots had to be unpacked as cautiously as Miss Hand had packed them. Each lot, when unwrapped, had to be transferred into the Museum's standard types of boxes, vials, and other containers. Miss Hand had spent several weeks in preparing her father's collection for transport, and now it took the Museum crew several months to process the treasures for reference use. The contents of the forty crates included some 6,500 lots of valuable material, aggregating about 150,000 individual shells. Many of the species in the Hand collection were new to us, but even those already represented in the Museum are of special interest because of the localities whence they came.

Some of the Chicago-area localities in which Mr. Hand collected have changed to such an extent that now they are almost destitute of mollusk life. Therefore many of Hand's specimens possess historical value.

The Joliet region is well covered by the Hand collection, providing thus another Illinois area that has been adequately studied with respect to its mollusk fauna. While traveling in Colorado, Hand and Ferriss discovered a land snail that subsequently was described as *Oreohelix handi* by Henry Augustus Pilsbry and Ferriss. Specimens of this rare species are included in the Museum's new acquisition.

This sketch indicates the scientific importance of the Hand collection. Chicago Natural History Museum is indeed indebted to Miss LaVerne Hand, who so wisely has made possible the use for research of her father's valuable assemblage of shells. The Museum will make this treasured collection available to laymen as well as to scientists. In recognition of her notable gift, the Museum's Board of Trustees has elected Miss Hand a Contributor—special Membership classification for outstanding donors.

BOYS AND GIRLS OF 4-H ON MUSEUM VISIT

Above: Alighting from buses that brought them to Museum for their annual visit is the first group of approximately 300 girls, delegates from all over the United States and Canada to the National 4-H Club Congress recently held in Chicago. Right: A group of 4-H boys and their leaders pause to study a mastodon while touring the Museum during their Chicago visit. David Techter (extreme right), Assistant in Fossil Vertebrates, had charge of 600 4-H boys.

'PLEASE SEND INFORMATION ABOUT EVERYTHING'

When we published "A Scientist Admonishes Teachers and Pupils" in the September issue of the BULLETIN we thought we were unique. We thought only of ourselves being deluged with questions such as "Please tell me all about animals" or "Please send me feathers (or bones) for my science project." We pointed out that much of the information requested could be gotten out of dictionaries and encyclopedias and that the value of a science project was in proportion to the effort put into it.

But we quickly found we were not alone with this problem. The General Biological Supply House in Chicago (Turtox) and the Rochester Museum of Arts and Sciences, Rochester, New York, asked for, and were granted, republication rights for the article. The same thing was becoming a burden for them.

Now we find in the December 17 issue of *Time* that the increasing "letter-requesting-information" problem is rampant elsewhere. Some are just swamped with such letters from children. The Massachusetts governor's office in Boston averages ten such letters a day; the Pittsburgh Chamber of Commerce handles more than 1,000 letters a month; the Chicago Association of Commerce and Industry gets 5,000 letters a month; the Douglas Aircraft Company in Los Angeles gets as many as 686 a week. Not only do they ask for simply "information" or such things as "everything [!] about your state," but they ask for pieces of coal, or samples of soil, or pictures and post cards. Some of the information, *Time* says, could be gotten out of any *World Almanac* or even a telephone book. "What is happening?" is the cry. "Are children being taught to write letters instead of how to look up information?" "What are U. S. teachers up to?"

While knowing that we have company in this problem may not be much consolation, there is some hope in knowing that other organizations have joined us in expressing their concern over the same problem.

AUSTIN L. RAND
Chief Curator of Zoology

Nature Photo Deadline January 14

Only a few days remain for entries of photographs in the Twelfth Chicago International Exhibition of Nature Photography to be held in the Museum February 1–24. The deadline for receipt of entries, which should be sent directly to the Museum, is January 14. The exhibit is sponsored by the Nature Camera Club of Chicago.

Entries will be in two divisions—prints and color slides. Entries in both divisions must qualify under one of three subclassifications: (1) Animal Life, (2) Plant Life, or (3) General (scenery, clouds, etc.). Medals and ribbons will be awarded.

Exhibit of Bird Paintings

"Birds of Venezuela," the special exhibit of 64 water-colors that opened December 24 in Stanley Field Hall, will be continued through January 27. The artist is Kathleen Deery de Phelps (Mrs. William H. de Phelps, Jr.). She resides in Caracas where her husband is connected with the Natural History Museum. The exhibit is sponsored by the Creole Petroleum Corporation, which published a handbook of South American birds illustrated with Mrs. de Phelps' paintings. In another exhibit at the Museum large photographs of Venezuelan scenes supplement the paintings.

AMERICAN JACANA

One of the paintings by Kathleen Deery de Phelps. The bird depicted is seen on almost all the lagoons and marshes of Venezuela. Its long toes enable it to walk on the floating leaves of aquatic plants.

NEW MEMBERS

(November 15 to December 14)

Contributors

Dr. Orlando Park, Miss Elisabeth Telling

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Ernest E. Clarke, Miss Frances Hooper, Mrs. Georgette Mehan, Edgar J. Uihlein, Jr.

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Dr. Herbert K. Abrams, Mrs. Orville T. Barnett, R. G. Boyd, Dr. Milton Braun, Carl Broutman, Robert M. Buddington, Philip W. Burge, Elwood H. Evans, Clyde B. Faverty, Robert Funderburg, Jossel Gerber, Robert Glassburg, Donald M. Graham, Mrs. George B. Hamilton, James W. Hammond, Kenneth C. Heffron, D. A. Hill, Sturtevant Hinman, Marshall M. Holleb, Robert K. Johnson, O. C. Lance, Ralph J. Lueders, Robert A. McClure, Charles A. Meyer, Don G. Miehls, Lee Craig Newton, Henry H. Niemann, Harvard R. Osmond, Victor H. Peterson, Frank G. Price, Frederick C. Pullman, Allan I. Roshkind, Walter L. Roth, Arthur V. Royds, Walter H. Seidel, Walter S. Snodell, Jr., Fred T. Sonne, Jack C. Staehle, Marvin N. Stone, Samuel G. Wagner, Lloyd Woodall, George L. Wright

AUDUBON LECTURE SET FOR JANUARY 27

"Ranch and Range," at 2:30 P.M. on Sunday, January 27, will be the third of the current series of screen-tour lectures presented in the James Simpson Theatre of the Museum by the Illinois Audubon Society. The lecturer is Albert J. Wool, who owns and operates a ranch near San José, California. The conservation of wildlife has been an abiding interest with Wool from boyhood, when he established a sanctuary for injured birds. For the past several years he has been producing motion pictures in color about wild creatures. In his lecture at the Museum he will especially feature the story of great birds of prey—golden eagles, hawks, and the rare California condor, the last of which is a living relic of prehistoric times now in danger of extinction. He shows many other birds and also mammals, presenting some interesting sidelights on fraternization of ranch animals with intruders from the wilds.

Specialist in Mineralogy Appointed to Staff

The appointment of Albert William Forslev, of Chicago, to the staff of the Department of Geology as Associate Curator of Mineralogy and Petrology became effective December 1. Mr. Forslev studied at both the University of Illinois and the University of Chicago, receiving the degree of Master of Science from the latter. He has been teaching at the Utilities Engineering Institute and the Illinois Institute of Technology. Formerly he was a geologist for a mining company.

Staff Illustrator Appointed

Miss Marion Pahl, formerly Artist in the Department of Zoology, has been appointed Staff Illustrator and will work in association with Staff Artist E. John Pfiffner. As a student at the School of the Art Institute of Chicago, Miss Pahl earned her degrees in fine arts and art education. She formerly taught art in schools of Lafayette, Indiana, and Berwyn, Illinois, and worked in the Burnham Library of Architecture of the Art Institute.

Entomologists' Open House

The Museum's Division of Insects held open house December 1 for members and guests of the Chicago Entomological Society. A short talk by Rupert L. Wenzel, Curator of Insects, on the scope and functions of the Museum and of the division in particular preceded conducted tours of the facilities and collections of the division. Associate Curator Henry S. Dybas and Dr. Harry G. Nelson acted as tour hosts. Dybas was elected vice-president of the society.

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Bulletin

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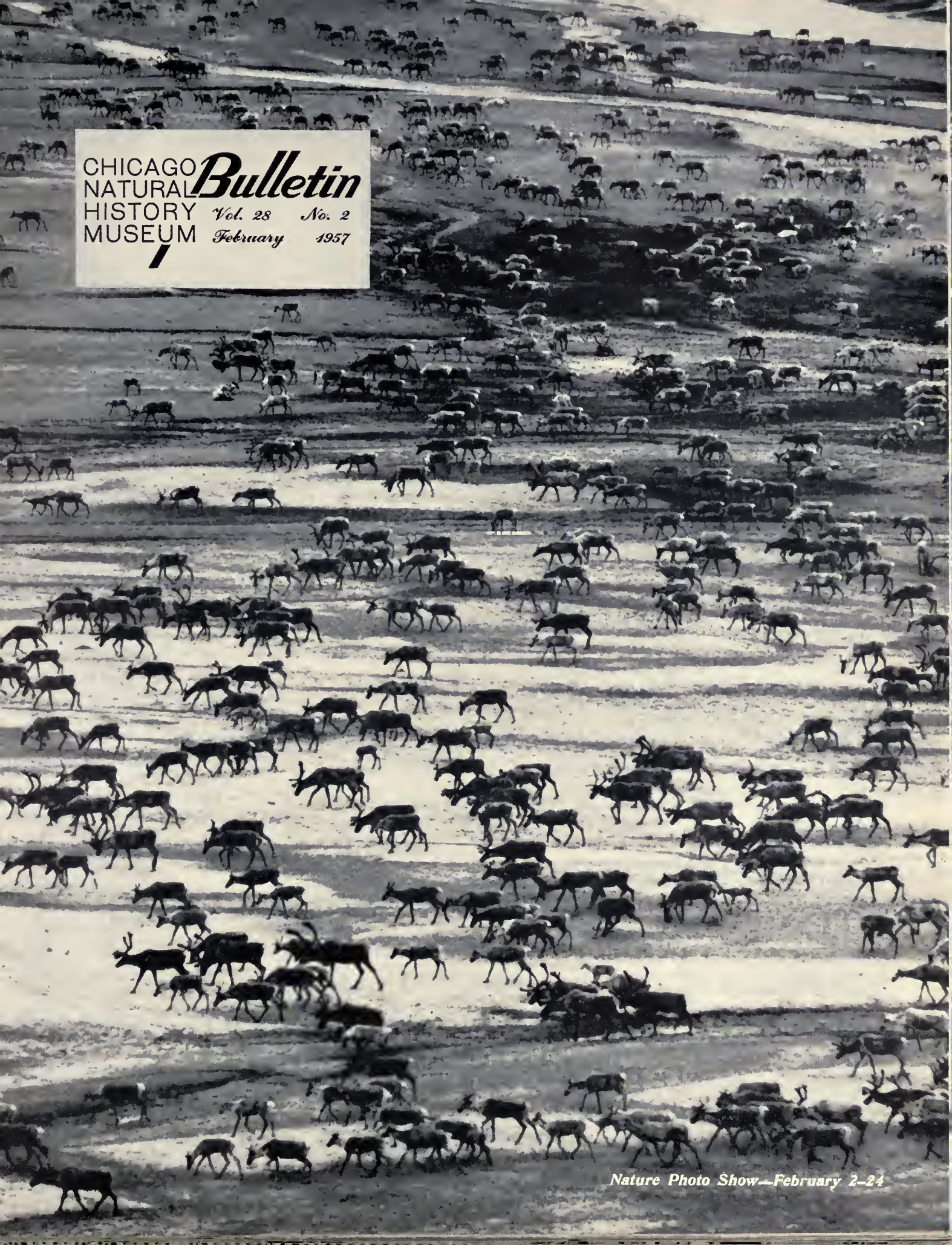

Nature Photo Show—February 2–24

Chicago Natural History Museum

FOUNDED BY MARSHALL FIELD, 1893

Roosevelt Road and Lake Shore Drive, Chicago 5

TELEPHONE: WABASH 2-9410

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THE BULLETIN

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Members are requested to inform the Museum promptly of changes of address.

EXPEDITIONS FOR 1957

Sites of prehistoric American culture in a new area hitherto untouched by archaeologists will be excavated this year by the Museum's Archaeological Expedition to the Southwest, which will go into its 23rd season. As in all its past operations, the expedition will be under the leadership of Dr. Paul S. Martin, Chief Curator of Anthropology. It will be the largest expedition to be undertaken by the Museum in 1957. The excavations will be made in east-central Arizona on the upper reaches of the Little Colorado River. Two contrasting sites will be opened up—one that was occupied at a very early date, about the time of Christ, and the other at an archaeologically late date, about A.D. 1350. The preliminary work of constructing base-camp buildings and general reconnaissance over the area to locate the most favorable sites for the "digs" was done in the 1956 season. Chief Curator Martin's principal associate, as for several past seasons, will be Dr. John B. Rinaldo, Assistant Curator of Archaeology. Working with them will be a staff of other archaeologists and local aids recruited to assist in the digging.

Other expeditionary projects for 1957 include the following:

An expedition to various countries in Central America will be conducted by Dr. Sharat K. Roy, Chief Curator of Geology, to continue volcanic studies that have been under way for several years. Particular attention will be paid this year to Costa Rica, a new region for Chief Curator Roy.

Dr. Theodor Just, Chief Curator of Botany, will go on an expedition to the Gingko Petrified State Forest in the state of Washington to collect fossil gingkos and fossil woods for both research and exhibition purposes.

George I. Quimby, Curator of North American Archaeology and Ethnology, will continue his survey of the archaeology of the western Great Lakes region, covering a period from about 10,000 B.C. to A.D. 1800.

Dr. Robert H. Denison, Curator of Fossil Fishes, and Bruce Erickson, Preparator of Fossils, will collect Devonian fish-specimens in western New York.

Dr. Eugene S. Richardson, Jr., Curator of Fossil Invertebrates, will collect in Montana in an area near Fort Peck. A particular objective will be specimens of Cretaceous lobsters that lived about 100 million years ago. William D. Turnbull, Assistant Curator of Fossil Mammals, and Orville L. Gilpin, Chief Preparator of Fossils, will resume collecting of Middle and Late Eocene specimens in the isolated Washakie Basin of Wyoming.

Rupert L. Wenzel, Curator of Insects, will collect histerid beetles and make specialized studies in areas near Boulder, Colorado, the Big Horn Mountains of Wyoming, and the Bad Lands of the Dakotas. Henry S. Dybas, Associate Curator of Insects, will collect minute insects of the Northwest Pacific Coast near Seattle, Washington.

Local field work will be conducted in Illinois by Dr. John W. Thieret, Curator of Economic Botany, and in Illinois and Indiana by Dr. Rainer Zangerl, Curator of Fossil Reptiles.

Kjell von Schneidern, Director of the Natural History Museum of the Universidad Nacional del Cauca, Popayan, Colombia, has accepted an assignment from Chicago Natural History Museum to collect mammals in the Macarena Mountains of eastern Colombia. Zoological collecting that has been under way in several fields for some years past will be continued: D. S. Rabor, Field Associate in the Philippines, and Dr. Robert L. Fleming, Field Associate in Nepal, will both collect birds, and Celestino Kalinowski will collect mammals in the Amazonian region of Peru.

DAVID DUNSMUIR

1896–1956

David Dunsmuir, Captain of the Guard at the Museum, died on December 27 after an extended illness. He joined the Museum guard force in 1944 and was promoted to Sergeant in 1949 and to Captain in 1953. Born in Arona, Pennsylvania, in 1896, he was taken by his Scottish parents to their homeland where he was reared and schooled. He worked in the mines in Scotland and served in the British Army for many years before returning to America.

THIS MONTH'S COVER

Seldom does a photographer capture so many large animals in a single picture as in the photograph entitled "Caribou Migrating" that appears on our cover. The photographer is Charles J. Ott of McKinley Park, Alaska, who has submitted it as an entry in the 12th Chicago International Exhibition of Nature Photography being held at the Museum from February 2 through 24 under the sponsorship of the Nature Camera Club of Chicago. The wandering herds of caribou are the most spectacular feature of the wildlife of Alaska and northern Canada. A herd in fall migration may number thousands of individuals, says Philip Hershkovitz, Curator of Mammals. It is made up of many small groups traveling together over ancestral routes in search of winter forage.

New Captain of Guard

Frank Meinke was appointed Captain of the Guard at the Museum, effective January 1, filling the vacancy caused by the death of Captain David Dunsmuir. Mr. Meinke joined the guard force in 1948 and was promoted to Sergeant in 1952.

NEW MEMBERS

(December 17 to January 15)

Associate Members

W. S. Bodman, John Noble Campbell, John S. Runnells, Miss Nina E. Schlatter

Sustaining Members

Albert L. Arenberg, Miss Laura Brodie

Annual Members

David L. Ader, Miss Lucinda Bellmar, Hal A. Bergdahl, George W. Butler, Ara A. Cambere, M. C. Duensing, Gordon H. Ewen, C. Ronald Fairs, Joseph B. Fitzer, William C. French, Jr., Chester M. Gaudian, S. U. Greenberg, Ralph C. Herdrich, Walter L. Howe, Charles E. Impey, Theo. Kauffman, Jr., Sidney D. Levin, Eli Lewis, Ralph Michaels, D. Robert Pierson, Russell R. Risdon, Edward P. Rubin, Arnold W. Ryan, Mrs. Mary Sokol, Harold C. Steiner, Casimir Pulaski Wronski

Specimens of more than 100 families of mollusks, arranged in their systematic order, are on exhibition in Hall M.

SATURDAY LECTURES BEGIN MARCH 2

"Monument Valley Adventure," a color film and lecture about an area in Arizona and Utah that has become the nation's last frontier and at the same time, because of uranium discoveries, the scene of its newest mineral boom, will be the opening feature of the Museum's 107th series of free illustrated lectures for adults. There will be a lecture each Saturday afternoon during March and April in the James Simpson Theatre. All will begin at 2:30 o'clock. The lectures are provided by the Edward E. Ayer Lecture Foundation Fund.

Francis R. Line of Pasadena, California, will be the lecturer on the opening program scheduled for March 2. Noted both for his camera work and as one of the most popular of travel lecturers, Line begins his story and film with the long trip into the frontier country by the Kayenta stage that carries mail and supplies from Flagstaff to the most remote post office in the United States, 125 miles from any railroad. Thence Line proceeds to Monument Valley and the largest Indian reservation in the country (as big as West Virginia) where he observes and films the life of the Navahos, who number some 70,000. From Moab, Utah, Line's film documents the boom activities now taking place in the world's second greatest uranium-producing field.

NATURE PHOTO EXHIBIT FEBRUARY 2—24

THE TWELFTH Chicago International Exhibition of Nature Photography will be held at the Museum from February 2 through February 24 under the auspices of the Nature Camera Club of Chicago. Entries have been received from both professional and amateur photographers all over the world, and those selected as the best will be displayed.

The exhibition is in two divisions—prints and color transparencies. Each division has three sections: Animal Life, Plant Life, and General (Scenery, etc.). Nearly two hundred prints chosen from among those submitted in the contest will be shown in Stanley Field Hall. The accepted color slides will be projected on the screen of the James Simpson Theatre at 2:30 P.M. on two Sundays, February 10 and 17. The showing is free to the public and all interested persons are welcome.

The judging of each of the thousands of entries is a difficult and time-consuming task, which this year was entrusted to a panel of five members: Russel Kriete, photographer; Dr. Jay Webb Lowell, physician and photographer; Barbara Palser, of the University of Chicago's Department of Botany; Dr. Eugene S. Richardson, Jr., Curator of Fossil Invertebrates at the Museum; and Melvin A. Traylor, Jr., Assistant Curator of Birds at the Museum.

Silver medals were awarded as first prizes in each section (animal, plant, and general) of each division—prints and slides. Many

A NATURE-PHOTO ENTRY
Portrait of a young blue-jay, submitted by Hanna Barsam, of Fresno, California.

entries were awarded ribbons to signify honorable mention. Special prizes for the best examples of complementary colors and of adjacent colors were also awarded by the Photographic Society of America. Names of all winners will be inscribed on a bronze plaque contributed by Mrs. Myrtle R. Walgreen, who is one of the Nature Camera Club's most active members. Reproductions of prize-winning pictures will appear in a catalogue to be published by the club. The winners were chosen after this BULLETIN had gone to press, but they will be listed in the next issue.

As in previous years, this exhibit continues to be the largest in the world devoted exclusively to nature photography. In fact, it is one of the largest photography exhibits in any category. All persons interested in this field are urged to begin work even at this early date on photographs that would be suitable for the 1958 event.

Curatorial Appointment

Dr. G. Alan Solem has been appointed Assistant Curator of Lower Invertebrates effective January 1. Dr. Solem first became associated with the Museum as a volunteer assistant in 1944. His interest in the invertebrates was stimulated by Dr. Fritz Haas, Curator of Lower Invertebrates, and led Dr. Solem through undergraduate work in zoology at Haverford College and a Ph.D. program at the University of Michigan. Dr. Solem is a specialist on land snails and has published several papers relating to their anatomy, ecology, and distribution.

MUSEUM TO BRANCH OUT IN PRIMITIVE ART

WITH the appointment, effective January 1, of Phillip H. Lewis as Assistant Curator of Primitive Art, the Department of Anthropology of Chicago Natural History Museum has taken a logical step essential to its status among departments of anthropology of the great museums of the world.

Throughout its history this Museum has been concerned with art in various ways. Many thousands of art objects are to be found among its ethnological and archaeological collections from widespread areas of the world. A noted authority on primitive art, Miguel Covarrubias, Mexican artist and archaeologist, has long been a Research Associate of the Department of Anthropology. The late Dr. Berthold Laufer, former Chief Curator of Anthropology, was a world authority on Oriental art, and his influence has left its mark upon the ideas of the Department of Anthropology through many of his publications and in the acquisition of many Chinese and other specimens for the Museum. This Museum has long co-operated with other institutions in making loans from its collections for exhibitions of art, primitive and otherwise.

EXHIBITS PLANNED

The establishment of a Division of Primitive Art means that this Museum has moved to claim for itself the position in anthropology and in art that it deserves as a major repository of objects representing man's creative efforts. This is perhaps the first major natural-history museum in the world to set up a specialized division of this sort.

In the near future a series of exhibitions will be prepared dealing with the nature of art as found among primitive and other peoples. Eventually attention will be given to the areal distribution of art on a world-wide basis.

Widespread interest in primitive art has been developing for the past fifty years and has increased recently. Many art museums have been interested in the art of non-European peoples in addition to the art of Europe and America. The intensification of the activities of Chicago Natural History Museum in this field has more significance than mere competition for public attention. It marks a pioneering attempt to study art scientifically.

In art institutions *art* is dealt with from historical and aesthetic points of view, which means that the main emphasis is upon the objects of art *per se* and their occurrence in space and time. By far the greatest emphasis today in art museums is placed on presenting objects of art as precious or, at least, interesting objects of enjoyment to the public. An anthropological point of view from which to study

(Continued on page 5, column 1)

MUSEUM ASKED TO SETTLE WAGERS AND SOLVE PUZZLES

By JANE ROCKWELL
ASSOCIATE EDITOR

IN PERFORMING one of its most important functions—enlightening and educating the public—a museum is often called upon to furnish some extraordinary goods and services. Many of these unusual requests for assistance can be attributed to fads, many are seasonal, and many, staff members suspect, are made with tongue-in-cheek attitude. Through the years some requests have become standard, such as entreaties for dinosaur bones desperately needed for a youngster's collection of precious miscellany or telephoned appeals to supply a troublesome word required in the daily crossword puzzle.

Rupert L. Wenzel, Curator of Insects, recalls a recent telephone call obviously coming from a tavern. A voice thickly inquired, "Which can pull a heavier load, an ant or a beetle?" Similar requests often

come into Curator Wenzel's office, but they never fail to leave him slightly puzzled. Usually the caller is settling a bet or an argument and is in no mood to articulate which species of ant or beetle he has in mind, thus precluding any possibility of a correct answer. The Division of Insects can count on a good crop of seasonal calls too. In the spring, summer, and fall various insect nuisances are reported and proper punishment sought. Business houses and transportation companies call throughout the year for advice on preventing insects from entering shipments of food or merchandise.

AID SOUGHT IN ROMANCE

Entomologists aren't the only recipients of unusual requests. Several years ago a young Southwest Indian lad, planning to marry a girl from one of the Great Lakes tribes, requested a medicine bag from the Department of Anthropology so that he could make a good impression on the tribe and especially on his future father-in-law. Anthropology staff members have had requests for left-handed arrowheads and for assistance on expeditions to California for Spanish gold and to Mount Ararat for the remainder of Noah's ark. One inquirer wanted to know if the department would be interested in purchasing the false teeth of famous personages.

Dr. Theodor Just, Chief Curator of Botany, tells of the time two boxes of candy arrived in his department as thanks for the staff's aid in helping a young man to win a prize on a quiz program. The program required that the contestant produce a dandelion in midwinter. Since it was not specified that the dandelion be alive, a specimen was sent on loan, to the young man's delight—and profit.

The current do-it-yourself trend has brought a flood of requests to the Department of Botany for information about driftwood and cypress from people planning to make lamps and other furniture. From time to time, Dr. Just says, individuals send in single plant leaves to be identified, failing to realize that arrangement of leaves is an important factor in identification.

Heading the popular request list in the Department of Geology are rocks and minerals. A steady stream of callers brings in or telephones descriptions of specimens to be identified. Some are convinced that they have discovered meteorites, in whole or in part, and are reluctant to be told otherwise. Uranium "discoverers" also are calling in increasing numbers.

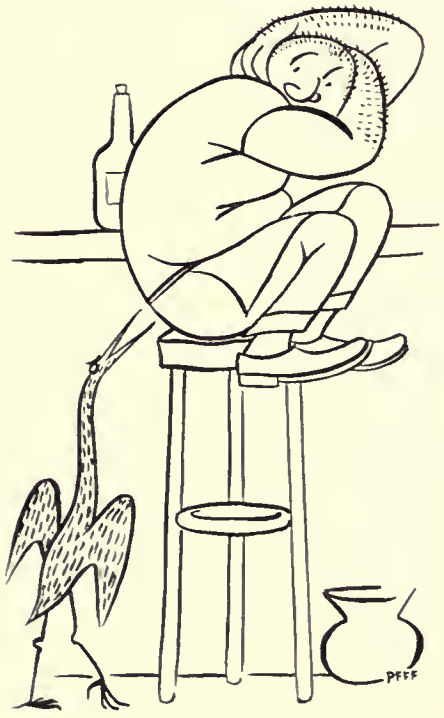
A TROJAN HORSE VARIANT

Dr. Sharat K. Roy, Chief Curator of Geology, remembers an incident several years ago when a woman entered his office with a shoebox in which she said there was a fossil coral. When she opened the box to show her prize to the chief curator, a swarm of angry bees flew out. Due to the circumstances, Dr. Roy was unable to make an accurate count of the number of bees, but he estimates that between 50 and 60 finally exited through hastily opened windows. His visitor, fully as angry as the inhabitants of the shoebox, stormed out of Dr. Roy's office and home to her husband, who, she said, was an incurable practical joker.

Cartoons by E. John Pfiffner

The Division of Birds also is popular with bet-settlers, who often call to make such inquiries as "Can any bird fly backward?" "Are there any birds that can fly 100 miles per hour?" "What is the measurement of the smallest hummingbird egg and the largest ostrich egg?" Sometimes the requests are more involved. Emmet R. Blake, Curator of Birds, cited a morning recently when a secretary, calling for her employer, requested a complete list of the birds of the world, which, she said, was needed immediately. Told that this would be out of the question, she sighed, saying she would call back in the afternoon when the list surely would be ready. Another person once called to ask "How does an eagle sing?" He was told that the sound was referred to as a scream. More dialogue followed in which the questioner demanded an exact description of the sound. Still not satisfied, the persistent caller asked Curator Blake to "scream like an eagle." At this point the curator felt his scientific obligation to this member of the public was nearing an end.

Some persons ask the help of the Museum in moments of crisis. A distraught bar-



tender called the Division of Birds one day to report that a "fierce" bird was chasing

his patrons. His hasty description seemed to indicate that the bird was an American bittern. In the background could be heard screams and the crash of furniture and glass. The Museum staff member handling the call asked the bartender (who sounded like the burly variety) why he was unable to catch the bird, which, if it was an American bittern, was about a foot and one-half high. The bartender answered frantically, "I can't get near it! It bites!"

PRIMITIVE ART—

(*Continued from page 3*)

art can be historical and can also take into account aesthetics, but its main emphasis is scientific. Art, anthropologists think, can be studied as an aspect of man's cultural and social life. An anthropological point of view does not deny the fact of widespread aesthetic sensibilities among the peoples of the world—indeed, it seeks to relate the products of such aesthetic impulse, or art, to society, to culture, and to the psychology of individuals. The best place for such study to proceed is in an anthropological museum, where are to found the specimens for study and where the scientific and objective attitude of anthropologists can prevail. The results of such studies can then be presented to the public in a series of exhibitions that will systematically explore the relationships of art to society by showing the actual objects of art in the context of graphic analyses of these relationships.

BACKGROUND FOR TASK

Phillip H. Lewis brings to the new position a background of art and anthropology. His training and background include, in addition to the Bachelor of Fine Arts degree (School of the Art Institute of Chicago, 1947), years of association with artists and actual skills as an artist in his own right. In 1952 the degree of Master of Arts in anthropology was awarded him at the University of Chicago. Currently he is working towards the Ph. D. degree at that university, writing a dissertation based upon study of a specific art-form being produced and used by people of a living community in Melanesia. The field observations for this study were made while on a Fulbright scholarship to the Australian National University in 1953–54, during which time Lewis and his wife lived in a New Ireland village community for seven months.

Lewis has been with the Museum in various capacities since 1949. He has twice been the Museum Fellow in Anthropology and has worked as Museum assistant, performing various duties, including those of keeper of the research collections and draftsman, designer, and preparator of the Cameroons King's House exhibit.

In 1955 he designed and installed a series of exhibits for the Henry Grout Historical Museum in Waterloo, Iowa.

NUTMEG AND MACE: SPICES FROM SAME SOURCE

By JOHN W. THIERET
CURATOR OF ECONOMIC BOTANY

IT IS SAFE TO SAY that but few persons —other than stamp collectors—know anything about or have even heard of Grenada. Some of them, upon seeing or hearing the name (pronounced gre-NAY-da), might mistakenly think of a Spanish city, the site of the Alhambra. Though unfamiliar with Grenada, most people are well acquainted with nutmeg and mace, the two major products of this small island, southernmost of the Windward group of the British West Indies. The fertile mountain slopes of Grenada are covered with groves of nutmeg

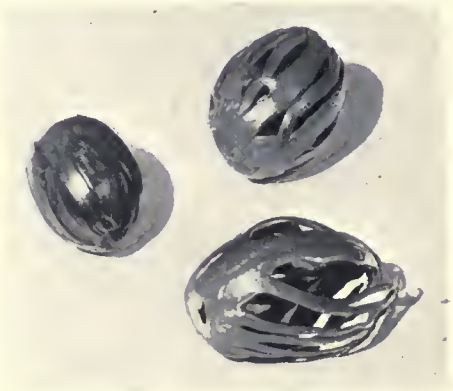
NUTMEG FRUITS

Unopened specimen at right. Naturally-split fruit at left showing the seed enveloped by the mace. The kernel of the seed is the nutmeg of commerce. These fresh specimens were recently sent to the Museum by the Grenada Co-operative Nutmeg Association of St. George's in Grenada.

trees and from these trees comes about 40 per cent of the world's supply of nutmeg and mace. The fact that both these spices come from the same tree was not appreciated by a certain English absentee landlord who owned a sizeable nutmeg plantation on Grenada. When he learned that mace from his plantation was selling for about three times as much as the nutmegs, he wrote to his overseer on the island: "Don't bother with the nutmeg trees any more. Let's plant additional mace."

The nutmeg tree, bearing the euphonious name *Myristica fragrans*, is a native of the Moluccas, the fabled Spice Islands of eastern Indonesia. It is a handsome, evergreen, somewhat bushy tree that can attain a height of 70 feet but, as known in cultivation, is usually only from 20 to 35 feet high. Its leaves are glossy and resemble those of the laurel, the bay leaves of commerce. When from five to ten years old, nutmeg trees begin to produce flowers, yellowish-green, inconspicuous, and rather similar in size and shape to those of the blueberry of our northern woods. The flowers are unisexual, that is, either male or female. Usually a tree bears flowers of only one kind, though occasionally some trees are found with flowers of both sexes. Sometimes a male tree, after several years, begins to produce female flowers and eventually becomes wholly female. Male trees, of course, bear no fruit but must be present in numbers sufficient for pollination of the female trees.

The fruit of the nutmeg, not unlike a large apricot, is pendulous, globose to somewhat elongate, and pale to bright yellow. When ripe it is a splendid sight. It commences to split into halves and to reveal its large solitary seed that soon drops to the ground as the split widens. The seed, about an inch long, is hard, glossy, and dark brown. Much of its surface is covered by a leathery aril of a color variously described as red, purple-red, or crimson. This aril has aptly been likened to a headless octopus whose tentacles—quite



IN AND OUT

Top right: nutmeg seed enveloped by the mace. Left: seed after removal of mace. Lower right: intact mace after its removal from the seed.

flattened, in this instance—are attached to the seed only at its base though they closely enwrap it to the top. The nutmeg of commerce is the kernel of the seed; mace is the aril.

TREES BEAR ALL YEAR

Nutmeg trees bear all year round but more heavily at certain times. In Grenada, for example, the major crop is harvested from September to February. Yields from different trees vary considerably. Certain trees in the East Indies have been reported to produce as many as 20,000 nutmegs a year, but this is most exceptional. Good trees in full bearing usually yield from 1,000 to 2,000 nutmegs annually.

At harvest time either the nutmeg fruits are picked before they drop their seeds or the fruit is allowed to split and the seeds are gathered from the ground. The mace is removed, flattened so that it will pack with less breakage, and then dried. Soon it becomes pale brownish-yellow to bright amber.

Following removal of the mace, the seeds

are spread out in shallow trays to dry. After a few weeks of sunning, they are shoveled into bags and stored in a well-ventilated place. The kernel of a fresh nutmeg-seed nearly or entirely fills the seed coat. As drying proceeds, the kernel shrinks somewhat and rattles when the seed is shaken.

Just before the time for shipment, the seeds are emptied from the bags, and women with wooden hammers crack the seed coats and remove the kernels—the nutmegs. The nutmegs are then ready for export. Some exporters, though, "lime" their nutmegs before shipment by dipping them in water in which slaked lime has been mixed. This is done to obviate attacks of beetles that can destroy the nutmegs or reduce their value considerably. It is said that this custom of liming had its origin in the days when the Dutch had a nutmeg monopoly and, in an attempt to restrict production to the Spice Islands, soaked their nutmegs in lime water to destroy germinative power before the nutmegs were exported. Actually, such precautions seem to have been unnecessary because the exposure of nutmegs to the sun for a week or more—done during the drying process—is said to destroy their viability.

TRADED IN SIXTH CENTURY

The classic peoples knew nothing about nutmeg and mace, for *Myristica fragrans* flourished only in the Spice Islands, from which no trade routes led to the western world. These spices may have been in commerce in ancient India, though, for nutmeg is still known in that country by a word derived from Sanskrit, the chief language of the India of antiquity. There can be no doubt, however, that nutmegs were objects of trade in 6th-century India, and it was at this time that the spice may have reached the fringes of southeastern Europe. The *nuces indicae*—nuts of India—mentioned by Aetius, writing at Constantinople in the year 540, may have been nutmegs. However, it was not until the 12th century that nutmeg and mace became familiar in Europe. The Arabians had by then ventured far to the east and brought back to Damascus, Beirut, and Constantinople cinnamon from the lush forests of Ceylon and, from India, nutmegs, mace, and cloves bought from Javanese merchants who put into Indian ports with their precious cargoes from the Spice Islands.

In the Arab cities the spices were sold to Venetian traders who took them home to add to the growing list of spices being used in Europe. But they did not take with them accurate knowledge of the origin of these products. Some thought that Arabia was the source; others repeated the fantastic tales fabricated by the Arabs—who, of course, were none too anxious to have the origin of these lucrative aromatics become general knowledge—and told of sea monsters, flesh-eating birds, and other fearsome creatures and awful dangers that had to be faced by venturers into the distant lands whence came the spices.

In A.D. 1158 nutmegs, under the name *nuces muscatorum*, were traded in the city of Genoa. And some thirty years later this spice, along with others, was used to perfume the streets of Rome as the Emperor Henry VI entered before his coronation. By the end of the 12th century, nutmegs and mace were found even in northern Europe. In England a pound of mace cost almost four times as much as a sheep and half as much as a cow, and the supply was not great enough to meet the demand!

SOURCE OF WEALTH

The true origin of nutmegs and mace was not discovered by Europeans until the 16th century, when the Portuguese added the Spice Islands to their many conquests in the East and obtained a monopoly in the trade of the spices produced there. But the empire of the Portuguese was destined soon to crumble, and one by one their strongholds fell to the Dutch. In 1605, men from Portugal were driven from the Moluccas by the men from Holland, and the Dutch took over the spice monopoly. In their efforts to make their monopoly secure, they endeavored to limit *Myristica fragrans* to two of the islands, Amboina and Banda, and to exterminate it elsewhere. For nearly two centuries they had almost complete control of the mace, nutmeg, and clove trade. If prices fell too low, they burned immense quantities of the spices stored in Amsterdam. Wealth from the products of the Orient poured into the Netherlands, and, in the resultant atmosphere of opulence and leisure, intellectuality and the arts flourished there as never before or since.

In 1769 the French succeeded in spiriting away cloves and nutmeg plants from the Spice Islands to Mauritius, an island in the Indian Ocean east of Madagascar. And in 1796 the British were successful in obtaining Spice Islands nutmegs and in establishing them on the island of Penang, off the Malay Peninsula. The Dutch monopoly had been broken.

An old saying tells us that nutmeg trees must be able to "smell the sea" if they are to do well. It is true that all the really successful plantations of *Myristica fragrans* have been at no great distance from the sea; most of them, indeed, are on islands. Perhaps realizing this, a certain Grenada planter, in the middle of the 19th century, persuaded a Dutch sea-captain to part with a few nutmeg seeds from his cargo. From these seeds grew fine trees that formed the beginning of a new industry on the island. By 1865 Grenada nutmegs reached world markets in noticeable quantities and the industry has increased steadily to the present day. It is estimated that 10,000 acres of the island are planted to nutmeg trees and that 35,000 people—about half of Grenada's population—are engaged in the production of nutmeg and mace.

Nutmeg is used to flavor puddings, sauces, meats, vegetables, beverages, and baked goods; mace, the "pound-cake spice," is an excellent seasoning for baked goods, preserves, sauces, and fish and meat dishes. For similar purposes are used the almost identical essential oils distilled from the spices. During the past five years, from four to five and one-half million pounds of nutmeg and from 500,000 to 600,000 pounds of mace were imported annually into the United States from Grenada and Indonesia. The value of each year's imports was in excess of $1,000,000, attesting the great popularity and wide use of these spices.

STAFF NOTES

The story of what an ornithologist does was presented by **Emmet R. Blake**, Curator of Birds, on the television program "Adventure Time" over Station WBKB (Channel 7) on January 15 .... **John W. Moyer**, head of the Division of Motion Pictures, presented his film and lecture, "Shikar in India," before audiences at Orchestra Hall on January 19 and 22 under the auspices of the Geographic Society of Chicago. He has recently filled numerous other lecture engagements, including one before the Toledo Zoological Society .... **Roland W. Force**, Curator of Oceanic Archaeology and Ethnology, presented a paper on Micronesia in a symposium at the annual meeting in December of the American Anthropological Association in Santa Monica, California. While there he participated in the organization of the Far Eastern Prehistory Association .... **Miss Marjorie A. West**, Assistant to the Librarian, recently visited the libraries of the Philadelphia Academy of Natural Sciences and Princeton University to discuss the interlibrary loan system and other matters .... **Dr. Karl P. Schmidt**, Curator Emeritus of Zoology, served as visiting lecturer and consultant on biological careers at Earlham College in January and gave a public lecture on his explorations in Peru. On January 17 he spoke on Israel's conservation problems before the Conservation Council in Chicago .... **Loren P. Woods**, Curator of Fishes, recently gave two lectures at Earlham College .... **Dr. Julian A. Steyermark**, Curator of the Phanerogamic Herbarium, recently lectured on the "lost world" of Venezuela before clubs in Wilmette, Wheaton, and Riverside.

Trunks of several kinds of rubber trees, methods of tapping, and principal varieties of crude material are shown in Hall 28.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance including postage are promptly filled.)*

MAMMALS OF THE WORLD, THEIR LIFE AND HABITS. By François Bourlière. Alfred A. Knopf, Inc., New York. 223 pages, including more than 200 photographs (24 in color) by numerous contributors and 34 line-drawings by Paul Barruel. Translated from the French. Cloth, $12.50.

Most striking part of this book is its collection of some of the world's finest examples of modern animal-photography. The sixteen pages of color plates give astonishingly realistic and intimate glimpses of twenty-three kinds of mammals in natural habitats. These and nearly 200 additional photographs in black and white record mammals caring for their young, cavorting on the plains, feeding, flying, fighting, swimming, stealing, resting, menacing, observing, or performing some other act of a vigorous animal in its own territory.

Indeed, these animals are more readily identified by the poses in which they are shown than they could be by the most detailed descriptions in the text. Not only are the physical characters of the animals sharply defined in the pictures but also the attitude of the individual is meaningful. The typically bold march of the lion across the African savannah in midday is contrasted with the equally characteristic nocturnal stealthiness of a tiger tiptoeing along a jungle trail in Asia. The picture of a herd of hippopotamuses submerged in a transparent pool in Kenya is a dramatic document in color of luxuriating idleness during the heat of an equatorial day; while the view of a herd of chamois on a steep snow-covered slope of the Swiss Alps illustrates how different animals can disport themselves with equal abandon in diverse habitats. The pages of this book make the reader feel that he is hobnobbing with the mammals of the world.

The text, consisting of about 60 full pages of the 225 in the book, is anticlimactic. Bourlière attempts to describe animals in terms of their respective habitats, but he fails to match the conviction and authority of the photographs; and he falls short of his confident and masterful treatment of the same subjects in his earlier book, *The Natural History of Mammals* (Knopf). Nevertheless, the text, in spite of its limitations in space and substance (a mere list of the world's mammals would require more pages than are in the book), gives a substantial basis for recognizing the fine balances in the relationship of animals to their environment. Except for a necessarily technical, though short, introduction to the classification of mammals, the text, which is simple and readable, focuses on the more fascinating aspects of animal life. The author knows well the mammals of the temperate and arctic zones, but his information on animals and environmental conditions of tropical latitudes lacks precision. This discrepancy largely reflects our present state of knowledge.

The book was printed in Paris, France, by E. Desfossés—Neogravure. In artistry of photography, naturalness of the subjects, quality of engraving and printing, the volume is far superior to similar ones entirely produced in the United States.

PHILIP HERSHKOVITZ
Curator of Mammals

AN ELEPHANTINE GOD OF WORLDLY WISDOM

An elephant-like creature, Ganesa, is the God of Wisdom and Prudence in the mythology of India that has been carried over into many of the islands of Indonesia, notably Java. The wisdom Ganesa typifies is not that pertaining to knowledge in the broad sense but the worldly wisdom that results in financial success. He is therefore particularly the favored god of shopkeepers. His elephant-head is supposed to represent sagacity. In his divine aspect he is the ruler over the hosts of heaven.

Exhibited in one of the Museum's halls of the Pacific (Hall G) is an ancient Javanese stone sculpture of Ganesa, shown in illustration above. In many portrayals the god has only an elephant-head, but in this sculpture he is entirely an elephant except for two human arms. One hand holds a vessel of water from which he draws with his trunk.

ATTENDANCE IN 1956 TOTALS 1,101,512

The number of visitors received at the Museum in 1956 was 1,101,512. Of these, 972,029 were admitted free, including adults who came on the free days (Thursdays, Saturdays, and Sundays) and persons to whom admission is free at all times (Members of the Museum, children, teachers, uniformed members of the armed forces, etc.). Those who paid the 25-cent admission fee charged adults on Mondays, Tuesdays, Wednesdays, and Fridays numbered only 129,483, or less than 12 per cent. This was the thirtieth consecutive year in which attendance exceeded a million. The total attendance in 1956 showed a slight increase over the previous year, when attendance had been 1,072,676.

As always, the Museum extended its benefits to hundreds of thousands of other people besides those who actually entered its portals. The largest and most important group outside its walls to whom the Museum carries natural-history information is composed of children who are repeatedly reached throughout each school year by extension lecturers sent out with films and slides by the James Nelson and Anna Louise Raymond Foundation and by the constant circulation of traveling exhibits through the service of the N. W. Harris Public School Extension.

Technical Publications

The following technical publications were issued recently by the Museum:

Fieldiana: Zoology, Vol. 34, No. 36. *Some Amphibians from the Lowlands of North Borneo.* By Robert F. Inger. 1956. 36 pages, 7 illustrations. 75c.

Fieldiana: Zoology, Vol. 34, No. 37. *Notes on a Collection of Fishes from Southeastern Venezuela.* By Robert F. Inger. 1956. 16 pages, 3 illustrations. 30c.

Fieldiana: Zoology, Vol. 34, No. 38. *A New Genus of Minute Fungus-Pore Beetles from Oregon (Coleoptera: Ptiliidae).* 1956. By Henry S. Dybas. 8 pages, 3 illustrations. 20c.

Fieldiana: Anthropology, Vol. 45. *Higgins Flat Pueblo, Western New Mexico.* By Paul S. Martin, John B. Rinaldo, Elaine A. Bluhm, Hugh C. Cutler. 1956. 218 pages, 85 illustrations. $4.50.

Fieldiana: Zoology, Vol. 33, No. 5. *On The Status and Relations of Crocodylus Mindorensis, Philippine Zoological Expedition, 1946–47.* By Karl P. Schmidt. 1956. 7 pages. 15c.

MOVIES FOR CHILDREN IN MARCH AND APRIL

Nine free programs of motion pictures for children will be given in the James Simpson Theatre of the Museum on Saturday mornings during March and April. The title of the first program, on March 2, is "Europe—from Caveman to Danny Kaye." This will comprise "The Story of Prehistoric Man," "Assignment, Children" (Danny Kaye), and an animated cartoon.

All programs are to be given at 10:30 A.M. and no tickets are required. Titles of the other eight programs will be announced in the March BULLETIN. Children are invited to attend alone, accompanied by parents or other adults, or in groups from schools, clubs, and other centers. The programs are presented under the auspices of the James Nelson and Anna Louise Raymond Foundation.

MUSEUM OFFICERS ELECTED

At the Annual Meeting of the Board of Trustees held January 21, Hughston M. McBain was elected First Vice-President of the Museum to fill the vacancy caused by the recent death of Marshall Field III. Mr. McBain had previously been Second Vice-President. Walther Buchen was elected Second Vice-President.

All other officers were re-elected. Stanley Field, the President, entered upon his forty-ninth consecutive year in that office. The other re-elected officers are: Joseph N. Field, Third Vice-President; Solomon A. Smith, Treasurer; Dr. Clifford C. Gregg, Director and Secretary; and John R. Millar, Assistant Secretary.

Two Contributors Elected

The Museum has received a collection of more than 12,000 North American insects as a gift from Dr. Orlando Park, Professor of Biology at Northwestern University and Research Associate in the Museum's Division of Insects. The collection represents a valuable addition to research materials.

Miss Elisabeth Telling, of Guilford, Connecticut, has presented a notable collection of ethnological portraits of the peoples of Indonesia and the peoples of most of the countries of Central America.

In recognition of their gifts, Dr. Park and Miss Telling have been elected by the Board of Trustees to the Museum's roll of Contributors.

Ornithologist Zimmer Dead

Dr. John Todd Zimmer, former Assistant Curator of Birds at this Museum (1922–30), died on January 6 at his home in White Plains, New York. For the past 26 years he had been on the staff of the American Museum of Natural History, New York, and in recent years was chairman of the Department of Birds.

'DO-IT-YOURSELF' REACHES PINNACLE IN MUSEUM

"If we can't get it we'll make it" is one of the maxims followed in preparing exhibits in all departments of Chicago Natural History Museum. By the use of many techniques and the application of the diverse talents of many scientists, artists, and technicians, facsimiles of the unobtainable are produced that most eyes could never distinguish from the original.

A recent example was the reproduction of two of the mysterious massive sculptured stone heads found on Easter Island, where even the present-day Polynesian inhabitants know nothing of their origin, age, or significance. A pair now adorns the Hall of Micronesia and Polynesia (Hall F). When the Department of Anthropology decided that these heads were needed for completion of the exhibits in Hall F and was faced with the impossibility of obtaining originals,

Walter Boyer, the department's ceramic restorer, was assigned to creating them on the basis of photographs and data supplied by archaeologists (illustration shows Boyer at work on this task). Color and texture of the heads now in the hall are exact duplications of the originals. Boyer, who joined the Museum staff about a year ago, is a graduate of the School of the Art Institute of Chicago and formerly was an instructor at Rockford (Illinois) College and at Chicago's Wright Junior College.

The techniques of preparing lifelike reproductions from nature are the everyday task of the laboratories of the Department of Botany because of the impossibility of preserving flowering and fruiting plants in bloom. Likewise, in the Department of Zoology, certain animals such as reptiles and even large nearly hairless mammals like rhinos are reproduced by special techniques because the original skins do not lend themselves to permanently life-simulating preparation. In the Department of Geology's paleontological laboratories it is often necessary to resort to restorations of fossil creatures millions of years old.

GIFTS TO THE MUSEUM DURING PAST MONTH

Following is a list of principal gifts received during the past month:

Department of Anthropology:

From: W. C. Biddle, Crystal River, Fla. —3 Hopi basket plaques, areas in Arizona; Mrs. Edward R. Finnegan, Chicago —opium pipe, China; Rev. David Hamm, Mindanao, Philippines—Moro musical instrument; Mrs. Edward C. Holmblad, Chicago—embroidered cricket-box cover, embroidered square, stenciled silk piece, China; Elisabeth Telling, Guilford, Conn. —45 drawings, Indonesia and Central America

Department of Botany:

From: T. P. Amidei, East Chicago, Ind.—cryptogam, Georgia; Karl E. Bartel, Blue Island, Ill.—*Liatris novae-angliae;* Holly Reed Bennett, Chicago—1,590 plant specimens, Illinois, Wisconsin, Indiana, Michigan, Montana; Illinois Natural History Survey, Urbana—2 photographs of *Broussenetia papyrifera* (paper mulberry); William Jewell College, Liberty, Mo.—295 unmounted and 57 mounted plants; S. B. Penick and Co., New York—spice samples; Dr. Karl P. Schmidt, Homewood, Ill.—50 unmounted plant specimens; U. S. Regional Soybean Laboratory, Urbana, Ill. —samples of 18 varieties of soybeans; U. S. National Museum, Washington, D. C.—54 phanerogams and ferns, 3 cryptogams, Cuba

Department of Geology:

From: William Heston, Chicago—skull of fossil mammal, shell of turtle, hand specimen of limy coquina, South Dakota; Chaplain Earl A. Keener, New York—4 fossil fishes, Greenland; Mrs. Walter Douglas, Chauncey, N. Y.—a specimen of fossil cycad bud, Arizona; Wendell B. Swanson, Chicago—105 fossil mammals, turtle, East Australia; R. C. Thomas, Park Forest, Ill.—hematite boulder, Wisconsin

Department of Zoology:

From: Ralph W. Axtell, Austin, Tex.—lizard; Laura Brodie, Chicago—32 turtles, South Carolina; Chicago Zoological Society, Brookfield, Ill.—otter, South America; Michael Duever, Chicago—rattlesnake; W. E. Eigsti, Hastings, Neb.—28 fleas; Dr. Arthur H. Greenhall, Port-of-Spain, Trinidad—9 snakes; Raymond Grow, Gary, Ind. —2 birds; Dr. Lindolpho Guimaraes, Brazil —14 batflies, U. S. and Brazil; Harry Hoogstraal, Cairo, Egypt—12 birdskins, 10 frogs, 44 lizards, 7 snakes, 2 turtles; E. R. Leach, Piedmont, Calif.—22 scarabaeid beetles; David Mertz, Chicago—30 snakes, Ohio and Ontario; Dr. Sherman Minton, Indianapolis, Ind.—111 reptiles and amphibians, Texas; Dr. Orlando Park, Evanston, Ill.—12,285 insects (mostly beetles), mostly U.S., and 319 insects, Tennessee; Mrs. Austin L. Rand, Chesterton, Ind.—four lots of inland mollusks, Tennessee; Fraser Walsh, Formosa—2 birdskins; William Gerhard, Chicago—reprint library on true bugs

The Museum Library is available for reference, Monday through Friday, from 9 A.M. to 4 P.M.

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CHICAGO NATURAL HISTORY MUSEUM

Bulletin

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LIFE IN PALAU

Special Exhibit—March 1–31

Chicago Natural History Museum
FOUNDED BY MARSHALL FIELD, 1893
Roosevelt Road and Lake Shore Drive, Chicago 5
TELEPHONE: WABASH 2-9410

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Members are requested to inform the Museum promptly of changes of address.

Books

THE LIVING MUSEUM. By Alice Millard Stowell. Vantage Press, Inc., New York. 88 pages, no photographs. $2.50.

Mrs. Stowell's enthusiasm for any and all museums, and especially the small and the new ones, is heartwarming even to an "old hand." She regards the mission of the museum in education and its role in the growing problem of leisure-time activities, as of great and urgent importance. She pursues this theme to the conclusion that *any* community would profit by organizing and developing its own museum.

The tone of *The Living Museum* is set by an admirable quotation from Aristotle:

"The glory, doubtless, of the heavenly bodies fills us with more delight than the contemplation of these lowly things, but the heavens are high and far off, and the knowledge of celestial things that our senses give us is scanty and dim. Living creatures, on the contrary, are at our door, and if we so desire we may gain full and certain knowledge of each and all. We take pleasure in a statue's beauty; should not then the living fill us with delight? And all the more if in the spirit of the love of knowledge we search for causes and bring to light evidences of meaning."

Mrs. Stowell's thoughts and proposals are primarily directed to the needs of an ideal small museum, and to the problems of organizing a small museum in a community where none exists. The ideas expressed in her book are nevertheless of interest to those in larger and older institutions where the exhibition activities compose an educational institute that may quite conceal the underlying research museum, and whose activities are within the framework of the advancement of science as a whole, though surprisingly interlocked with the problems of exhibition. Our interest in the smaller museums (for I speak for my colleagues) is a double one. A small museum, given the right director and the opportunity, may pioneer in the exhibition field, experimenting with new ideas and new techniques, and thus perform an invaluable service to the larger institution. On the other hand, the smaller museum may be dependent on the resources and experience of the larger one, though still often to mutual advantage.

Each of the major sciences may profit by having a museum of its own, and such special museums have abundant precedent, especially in Europe. In general, the art gallery, the historical museum, and the anthropological museum tend to pursue their independent ways when opportunity exists. Even the natural history museum may be limited to one or the other of the observational natural sciences (geology, botany, and zoology), though these are fruitful collaborators among themselves in both exhibition and research. The small museum, however, has no such opportunity to specialize, nor can it develop collections purely for research. It must combine the local interests in art and historical relics with local special opportunities, and with emphasis on service to the schools. Mrs. Stowell should be drafted as organizer and first director by any community where the opportunity for the development of a museum arises.

KARL P. SCHMIDT
Curator Emeritus of Zoology

THIS MONTH'S COVER

A "psós era nylóik," "klas era chei," and a "pískang," are three of the artifacts Museum visitors will be seeing in Stanley Field Hall this month when "People of Palau," a special exhibit of material collected from the Palau Islands in Micronesia, goes on display. The words above are native names for the three illustrated objects, which are a dance paddle, diving goggles and a fish spear. The cover design is the work of E. John Pfiffner, Staff Artist, who painted it originally for color television publicity for the Museum. For more information on the culture of the Palauans, see page 3.

STAFF NOTES

Dr. Paul S. Martin, Chief Curator of Anthropology, and **Dr. John Rinaldo,** Assistant Curator of Archaeology, participated in a meeting February 16-17 at Carbondale, Illinois on "Affiliations of the Southwest with Mexico." . . . **George I. Quimby,** Curator of North American Archaeology and Ethnology, lectured on "Paleogeography and Prehistoric Archaeology of the Upper Great Lakes Region" at a recent meeting of the Kennicott Club held in the Museum . . . . **Phillip H. Lewis,** Assistant Curator of Primitive Art, is author of an article, "Primitive Art in a Natural History Museum," that appeared in the February issue of *Townsfolk* magazine . . . . **Dr. Julian A. Steyermark,** Curator of the Phanerogamic Herbarium, recently lectured on "Wild Flowers" before the Kansas City Garden Club, the Highland Garden Club of Evanston, and on "Lost World of Venezuela" before the Yardstick Garden Club of Wheaton, Illinois . . . . **Rupert L. Wenzel,** Curator of Insects, spoke on collecting and identifying insects for the Annual Pest Control Conference of the 9th Naval District at Great Lakes, Illinois . . . . **Mrs. Meta P. Howell,** Librarian, and **Mrs. M. Eileen Rocourt,** Associate Librarian, attended the midwinter conference in Chicago of the American Library Association . . . . **Dr. Theodor Just,** Chief Curator of Botany, gave a seminar-lecture on "Recent Advances in Paleobotany" for the Department of Biological Science of Loyola University.

Daily Guide-Lectures

Free guide-lecture tours are offered daily except Sundays under the title "Highlights of the Exhibits." These tours are designed to give a general idea of the entire Museum and its scope of activities. They begin at 2 P.M. on Monday through Friday and at 2:30 P.M. on Saturday.

Special tours on subjects within the range of the Museum exhibits are available Mondays through Fridays for parties of ten or more persons by advance request.

Ceylon Museum Director Here

Dr. P.E.P. Deraniyagala, Director of the Natural History of Colombo, Ceylon, and a State Department guest of the United States, recently visited the Museum's Division of Amphibians and Reptiles.

PALAU EXHIBIT TRACES CHANGE IN A PACIFIC CULTURE

By ROLAND W. FORCE
CURATOR OF OCEANIC ARCHAEOLOGY AND ETHNOLOGY

THE PALAU ISLANDS in the Western Pacific were home to my wife and me from December, 1954 to April, 1956, when we were engaged in research for the Tri-Institutional Pacific Program. We investigated three major problems: social structure, political change, and emergent leadership. In addition, we did general ethnography and assembled a representative collection of material culture for Chicago Natural History Museum. Portions of this collection will form a special exhibit in Stanley Field Hall March 1–31.

COUNCIL HOUSE IN PALAU

Such structures, called "abai," were used in earlier times by the hereditary chiefs, who still meet in them for special occasions. Today they are also used for weddings, dances, and ceremonies.

In addition to photographs of Palauans and their way of life, the exhibit will include clothing, woven mats, and containers, fishing gear, utensils, ornaments, weapons, native money, and other items.

Situated in the Western Carolines, the Palau group is located approximately 435 nautical miles due east of Mindanao in the Philippines. The islands in this chain are the most diversified topographically in all of Micronesia. Included are high volcanic islands, low coral atolls, raised coral atolls (phosphate), and both high and low single coral islands. They are encircled protectively by fringing reefs, barrier reefs, and shoal reefs. The chain itself is 125 miles long and 25 miles wide. Within the archipelago that comprises the Palau Islands are approximately 243 islands. The total land area of the Palaus is about 185 square miles. The population of some 7,500 persons is clustered on but eight of the islands.

The inhabitants enjoy a mild, tropical, oceanic climate in which mean rainfall approximates 150 inches a year. The temperature is steadily high—around 82 degrees. The strong trade winds which alternate with the southwest monsoon keep the high humidity from becoming inordinately oppressive.

POLITICAL CONTROL BY UN

The Palaus are controlled today by the United States under United Nations trusteeship. The Caroline Islands (of which the Palau Islands are a part), the Marianas Islands, and the Marshall Islands form together what is known as the Trust Territory of the Pacific Islands. Formerly this territory was a Japanese-mandated territory under the League of Nations. After World War II United States military forces controlled the area which is more widely known as Micronesia. In a few years control was transferred to civilian administrators under the United States Department of the Interior. Today the islands are administered by a relatively small staff that has its headquarters in Guam.

Foreign administrations have come and gone in the islands of the Pacific. In 70 years four great world powers have governed Palau—Spain, Germany, Japan, and the United States. The cycle of life goes on much the same no matter who is in control. Women grow the family food in swampy garden patches in the lowlands and in dry gardens on the hillsides. The men go to the lagoons in search of fish and crabs.

Time has brought changes, to be sure. No longer are heads of enemy inhabitants of neighboring villages taken as prizes of war. The last intervillage war was fought during German rule around the turn of the century, and only a few old chiefs recall the event with some nostalgia. Casualties usually were not heavy; at most one or two lives were lost in a battle. Warfare brought color and excitement into an otherwise relatively drab existence. However, warfare is not civilized, so the foreigners commanded that it be stopped. The program of pacification involved as well the order that the worship of the native pantheon would cease. Finally it did and very little of aboriginal religious lore remains.

WESTERN WORLD TREND

Missions attracted natives in greater or lesser degree over the years after the first one was established around 1885. Close on the heels of salvation came the necessity to wear clothing of Western World style. The grass skirt went the way of warfare and religious belief. Today it is revived on only very special ceremonial occasions when a new mother is feted in public. Similarly the house style has changed as the old thatched structures have given way to the corrugated iron-roofed house. China plates have replaced the gracefully shaped wooden bowls and platters of the old days.

Some changes have been quite beneficial. Health is better than it has ever been. Infant mortality has been amazingly reduced by modern methods and trained personnel. No one suffers from the dreaded "yaws" thanks to penicillin. There are more schools than there ever were during other administrations. The United Nations' attitude toward development of self-government means that Palauans are having more and more to say about their own affairs. One thing has not changed—betelnut-chewing is still the national pastime.

The range of racial characteristics found

PINPOINTS IN THE PACIFIC

The Palaus are in the westernmost part of the Trust Territory of the Pacific Islands. Relative size of the territory, shown above in dotted outline, is demonstrated by superimposed outline map of the United States. Ocean area included consists of about 3,000,000 square miles. The Palau group is approximately 4,000 miles southwest of the Hawaiian Islands.

in Palau runs the gamut. Skin color varies from light to dark brown with reddish tendencies; hair color is universally dark-brown to black with a similar decidedly reddish pigmentation. Hair-form may be frizzly, wavy, or straight; lip-form ranges from slight to moderate eversion. Stature is relatively short and there is heavy muscular development. While weight increases with age in some individuals, obesity is not generally characteristic. The epicanthic fold, or so-called Mongoloid eye-form so characteristic of other Micronesian groups, is not so pronounced in Palau. Certain individuals transported to the Philippines or Indonesia would correspond to the basic racial types there. Others display characteristics which attest to Melanesian antecedents. Still others possess the stature and the avoirdupois, straight hair, and skin color ordinarily thought to characterize the Polynesians. Palau's geographical position is such that it rests on the very threshold of the Pacific and countless waves of migration must have ebbed and flowed through this aperture to the further reaches of Oceania. What is undoubtedly a long history of racial admixture is attested to by the folk tales of the Palauans which provide evidence of contact with Yap, the Philippine Islands, Woliae, and Melanesia.

SCHOOL ROOM: A HISTORY CLASS

The teacher's costume, despite appearances, is conventional for Palau. Some of the instruction in various subjects is given in English. While the American administration provides guidance as to curriculum and techniques, the actual operation of the schools, and the teaching, is handled by the Palauans.

MEANS OF SUBSISTENCE

The traditional means of subsistence in Palau has been the cultivation of root and other crops combined with the exploitation of the reef and lagoon marine life. Only a few domesticated animals such as pigs and chickens are kept for food and their consumption is confined almost exclusively to ceremonial occasions. There is also a limited number of birds (megapodes, pigeons, ducks, etc.) that have been hunted in the past or are still hunted today. The primary vegetable food staples consist of wet-farmed taro—a root plant which is grown in lowland, swampy, paddy-like enclosures—cassava, sweet potatoes, and a little corn along with squashes and some dry taro grown in hillside gardens. In addition there are various other auxiliary vegetables, fruits, nuts, and other plants. Coconut palms are plentiful and the nuts are much utilized in Palauan diet. The protein staple is provided by fish, eels and shellfish.

Good taro and dry-garden land is limited on Palau and there are relatively few surpluses of produce. Problems of storage and spoilage in a tropical climate further complicate the production of surpluses. On the other hand, there is no food shortage. Palauans pride themselves on the fact that there is no such thing as a hungry Palauan. Reciprocal hospitality customs, coupled with an extremely ramified and extensive expansion of the kinship system, leave no person without the opportunity to secure food and drink wherever he may be.

KINSHIP EMPHASIZED

The primary unit of social organization in Palau is the household. A cluster of from five or six to as many as 20 or 30 households make up a village. Today groups of federated villages form political divisions known as municipalities. In former times federations were arranged along kinship and pseudo-kinship lines primarily for purposes of defense and warfare. The analogy to the kinship system with respect to village alignments is carried to the extreme that certain villages are considered "big brothers" of other villages.

Kinship is determined very broadly indeed. One traces his descent on his mother's as well as his father's side. There is a tendency for the maternal side of the family to be emphasized over the paternal, but residence is patrilocal. When a couple marries, they go to live with the family of the groom. However, the issue is further complicated because a man may inherit land and titled rank from his mother.

Age-respect is a special feature of many Pacific cultures and Palau is no exception. Elders are treated with great respect, be they male or female. Younger people must yield to them in conversation, certain postural and gestural recognitions are accorded them, and special terms are used to address persons older than the speaker. By the same token a series of special terms also is used when speaking to relatives younger than the speaker. In aboriginal times age-grade societies were universal. Within each village was a series of societies or clubs for men and a corresponding series for women. The clubs were named and in the men's case each group lived in a separate club house. Women had no club houses. The men's clubs supplied warriors and the village police. In case of trouble, such as murder, certain negative sanctions would be directed by the chiefs of the village toward the offender and the designated club would mete out justice. An offender's house would be destroyed along with his livestock and his personal possessions. He might be beaten and most certainly he was fined.

MONEY AND THE EXCHANGE SYSTEM

One's family helped him buy a house or a canoe by contributing bead money for the specific purpose. If a young man wished to marry, his family provided a sum of money so that he might obtain a wife. Money payments were made to the wife's family during marriage at prescribed intervals. If the couple separated, the family of the wife was likewise compensated. In turn, the wife's family supplied food for the man and his wife. These practices survive with the added feature that today American currency also is employed.

RESPECTED MATRIARCH

Advanced age is accorded great respect in Palau, and women, especially when elders, have a voice in deciding policy. This woman, named Sebelau, exhibits the old style of arm tattooing.

Indigenous political organization was closely correlated with social organization. The senior male and female members of

(*Continued on page 7, column 3*)

ADULT LECTURE SERIES OPENS THIS MONTH

IT'S TIME to travel. If you can't get away from desk and household ties, the next best thing to actually going is to visit some of those far-off places by means of the color films and lectures offered on Saturday afternoons throughout March and April in the James Simpson Theatre of the Museum.

The spring series of free illustrated travel lectures is the 107th to be presented under the provisions of the Edward E. Ayer Lecture Foundation Fund. Seats in a reserved section of the Theatre are available to Members of the Museum. The lectures are given each Saturday afternoon, at 2:30. Dates, subjects, and titles follow:

March 2—Monument Valley Adventure

Francis R. Line

This is the story of America's last frontier, in Arizona and Utah. Line's film shows how he penetrated the remote area by the old-fashioned stage that carries mail and supplies from Flagstaff to the most isolated post office in this country, with the nearest railroad 125 miles away. The life of the Navajo Indians, some 70,000 of whom dwell in the area on the largest of all reservations, is recorded in films showing why the adverse living problems of this people pose such a problem. Near Moab, Utah, Mr. Line surveys the boom of activities currently caused by operations in the world's second greatest field for the production of uranium.

March 9—The New Egypt

Willis Butler

A color-film and lecture as timely as today's newspaper will be presented by Willis Butler, of Evanston, Illinois. Even President Nasser, a key figure in the Suez crisis, appears in the film. Butler tries to give his audience a firmer basis for a real understanding of the Egypt of today. His camera focuses on the daily life of a typical village family. He shows the drastic changes wrought in the country's economy since the revolutionary government came into power in 1952. There is a complete transit through the Suez Canal, and a visit to Aswan's high dam site which has for some time been an issue in international affairs. Butler also shows a film of "the tourist's Egypt" with its pyramids, sphinxes, and other strange antiquities.

March 16—The St. Lawrence—Seaway to the World.

Lt. Col. Arnold Maahs

Another extremely timely presentation is Colonel Maahs' film and lecture on the waterway which is expected to make Chicago one of the most important of seaports. Maahs has documented not only the economic factors involved, but also the human interest story of the people and places along the great St. Lawrence River as it stretches to the sea. Besides the seaway proper as currently under construction, Maahs takes his audience on visits to Old Fort Niagara, Montreal, Quebec, and the Gaspe Peninsula.

March 23—Stepping Stones to Australia

Alfred M. Bailey

In his film and lecture, Dr. Bailey, Director of the Denver Museum of Natural History, offers a pictorial account of the islands used as air bases en route to Australia. There are four such isles in the Pacific that have been of great importance in developing the air routes to Australia. They are: Oahu in the Hawaiian group, with its great International Airport; little Canton Island on the equator governed jointly by the United States and Great Britain; Viti Levu, the large island of the Fiji group (a crown colony of Britain); and New Caledonia, a colony of France and formerly a penal settlement. All were of great strategic importance in World War II. Each is a colorful area. Oahu has its great city of Honolulu. Canton teems with bird life. Viti Levu provides a tropical setting for an interesting people. New Caledonia has an intriguing history.

March 30—Solo Kumbu—Land of the Sherpas of Nepal

Norman Dyhrenfurth

One of the world's most famous mountaineers, Norman Dyhrenfurth, in color-films and narrative, will tell the story of his 1955 International Himalayan Expedition to attempt the ascent of Lhotse, neighbor of Mount Everest. Lhotse is the world's fourth highest peak. Against formidable odds, Dyhrenfurth and his intrepid associates climbed to within a scant quarter-mile of the summit, but were turned back, after reaching an altitude of 26,600 feet, by failing oxygen, raging storms, and unendurable physical and mental exhaustion. In addition to the adventures and perils of the climb, the films show the daily life in high mountain villages, and some of the fantastic ceremonies and dances in lama monasteries. The Sherpas referred to in Dyhrenfurth's title are natives of the Himalayas who, as high-altitude porters, have played a vital role in many important expeditions. Solo Khumbu is the Nepalese name for their homeland.

April 6—Birth of a Mangrove Isle

Henry W. Briggs

This film and lecture tells the story of the ecology of one of the thousands of subtropical islands, collectively known as the Mangrove Keys, that ring the southern coasts of Florida. A mangrove is one of the few trees that can grow in salt water. The film traces the natural planting of the seed through wind and wave action, and as the tree develops, the coming of various creatures to make their homes on the island in

(Continued on page 7, column 1)

RESERVED SEATS FOR MEMBERS

No tickets are necessary for admission to these lectures. A section of the Theatre is allocated to Members of the Museum, each of whom is entitled to two reserved seats. Requests for these seats should be made in advance by telephone (WAbash 2-9410) or in writing, and seats will be held in the Member's name until 2:25 o'clock on the lecture day.

CHILDREN'S PROGRAMS ON SATURDAYS

Free programs of motion pictures for children will be presented each Saturday morning in March and April at 10:30 in the James Simpson Theatre of the Museum. Children are invited to come either individually, accompanied by adults, or in groups from schools, clubs, and other centers. They do not need tickets. The programs are the spring offering of the James Nelson and Anna Louise Raymond Foundation.

In addition to films, on two of the programs the explorers who made the pictures will appear personally to tell their stories. Following is the schedule for the season:

March 2—Europe—From Cave Man to Danny Kaye
Also a cartoon

March 9—Animal Stories
Also a cartoon

March 16—The Little Fugitive
(The adventures of a small boy in a big city)

March 23—Stepping Stones to Australia
(Narration by Alfred M. Bailey)

March 30—Country Children Go to Town
Also a cartoon

April 6—Dumbo
(Walt Disney's story of a baby circus-elephant)

April 13—Families of the Far East
Also a cartoon

April 20—Animals at Night in Color
(Narration by Howard Cleaves)

April 27—Fairy Tales
Also a cartoon

LIST OF WINNERS IN NATURE PHOTO CONTEST

SEVEN HUNDRED EIGHTY-TWO persons in nearly every state and territory of the United States and several foreign countries entered a total of 3,262 photographs in the Twelfth International Exhibition of Nature Photography held in the Museum during February. Although somewhat smaller than the 1956 contest in total number of pictures submitted, the photographs received have improved in quality. More than two-thirds of those submitting

SOLOMON'S SEAL

By H. J. Ensenberger, of Bloomington, Illinois. Awarded first-prize silver medal in Plant-Life Section of Nature Photography Exhibition.

pictures have entered this annual photography contest one or more times previously.

The methods by which the pictures are graded by a panel of five judges are as impersonal and unbiased as humanly possible. Neither the maker's name nor the titles he has given his pictures are revealed to the judges. This is of interest because the titles given to pictures by their makers sometimes are completely erroneous, as when a shield bug is called "beetle," or more often fanciful and of no help in identifying an unfamiliar object or scene.

This year, as in almost every year previous, some photographs, given passing scores by the judges, on later and closer examination proved to be pictures of mounted birds, dead dry insects with missing parts, or formal arrangements of flowers that had won acceptance. In another instance a photographer reversed a negative in printing so that the flow of lines was more pleasing to him. But in the process he had endowed the land snails shown with a highly unorthodox left-hand spiral.

The exhausting two-day judging of pictures resulted in the acceptance of 173 prints and 818 color transparencies. These figures represent an unusually large proportion of the total number submitted in each category and are an indication of the generally better quality of pictures entered in the exhibition. Each year the Nature Camera Club of Chicago, co-sponsor of the exhibit, shows progress toward its objective: "To make the photographer a better naturalist and the naturalist a better photographer."

Following are the names of entrants who received silver medals and honorable-mention awards:

MEDAL WINNERS

Prints:

ANIMAL-LIFE SECTION: Bob Leatherman, San Bernardino, Calif.—*Landing Gear Down*

PLANT-LIFE SECTION: H. J. Ensenberger, Bloomington, Ill.—*Solomon's Seal*

GENERAL SECTION: Harry Harpster, Salt Lake City, Utah—*November Morning*

Color Slides:

ANIMAL-LIFE SECTION: Torrey Jackson, Marblehead, Mass.—*Arctic Tern*

PLANT-LIFE SECTION: F. C. Gebhardt, Erie, Pa.—*Nature's Grill Work*

GENERAL SECTION: Henry Greenhood, Los Angeles—*Cloud Shroud*

HONORABLE MENTIONS

CHICAGO AREA

Prints:

ANIMAL-LIFE SECTION: Ted Farrington, J. Musser Miller

Color Slides:

ANIMAL-LIFE SECTION: Louise Broman, Ted Farrington.

PLANT-LIFE SECTION: Carl Hallin, H. L. Marshall, John E. Osterman, Jr., Melvin A. Peterson, M. J. Schmidt

GENERAL SECTION: J. Hendry, Charles Albee Howe, Blanch Kolarik, Mitzi Strasser

OUTSIDE CHICAGO AREA

Prints:

ANIMAL-LIFE SECTION: H. S. Barsam, Fresno, Calif.; Leslie A. Campbell, Belchertown, Mass.; H. Lou Gibson, Rochester, N.Y.; Wilfred E. Jossy, Bend, Ore.; Francis A. Kingsberry, Ponca, Neb.; Bob Leatherman, San Bernardino, Calif.; Albert Matsick, Streator, Ill.; Charles J. Ott, McKinley Park, Alaska; Nate Sock, Providence, R.I.; William L. Van Allen, Bend, Ore.; Mme. Van den Bussche, Antwerp, Belgium; John Whipple, Arlington, Tex.

PLANT-LIFE SECTION: Helen Albertson, Sioux City, Iowa; George C. Bartholomees, Bonne Terre, Mo.; Caryl R. Firth, Trappe, Md.; Rudolph G. Flores, Los Angeles; O. M. Holst, Phoenix, Ariz.; Howard E. Foote, New York; Herman J. Krohn, Omaha; Gilbert R. Lehmbeck, Harper Woods, Mich.; Howard Oberlin, Canton, Ohio; M. G. Smith, Fresno, Calif.

GENERAL SECTION: Joseph Haugland, New York; Gilbert R. Lehmbeck, Harper Woods, Mich.; Bosworth Lemere, Carpinteria, Calif; Milan Pavic, Yugoslavia; Gertrude Pool, Palo Alto, Calif.; Henry Ryffer, San Diego, Calif.

NOVEMBER MORNING

By Harry Harpster, of Salt Lake City, Utah. Awarded first-prize silver medal in General Section of Nature Photography Exhibition.

Color Slides:

ANIMAL-LIFE SECTION: S. G. Blakesley, Merced, Calif.; A. Calhoun, Huntington, N.Y.; W. L. Dennis, Decatur, Ill.; Edward Dowling, Sharon Hill, Pa.; H. Lou Gibson, Rochester, N.Y.; B. J. Kaston, New Britain, Conn.; Emil Kittel, Alton, Ill.; John A. Krimmel, Denver; W. G. Laird, Bowmanville, Ont., Canada; Robert Leatherman, San Bernardino, Calif.; S. D. MacDonald, Iowa City, Iowa; Andree Robinson, Tucson, Ariz.; M. G. Smith, Fresno, Calif.; Dave Stager, Bloomfield, N.J.; H. A. Thornhill, Watertown, N.Y.; John E. Walah, Beverly, Mass.; Mrs. John Walsh, Beverly, Mass.; Leslie A. Campbell, Belchertown, Mass.; Louis Quitt, Buffalo, N.Y.

PLANT-LIFE SECTION: Blanche H. Adams, Phoenix, Ariz.; Dr. L. H. Andrews, St. Joseph, Mich.; H. E. Berry, Wellesley, Mass.; H. L. Gebhardt, Erie, Pa.; H. Lou Gibson, Rochester, N.Y.; G. Guiberson, Olympia, Wash.; Ferrel Hessing, St. Louis; Agnes M. Holst, Phoenix, Ariz.; C. O. Horst, Dayton, Ohio;

LANDING GEAR DOWN

By Bob Leatherman, of San Bernardino, California. Awarded first-prize silver medal in Animal-Life Section of Nature Photography Exhibition.

J. F. Johnson, Minneapolis; S. G. Johnson, Hemet, Calif.; A. G. Juckins, Worcester, Mass.; Elven Kellogg, Battle Creek, Mich.; Cmdr. J. L. Kenner, USN, Boston; Estelle Marker, Oakland, Calif.; Betty Moore, Pittsburgh; Floyd Norgaard, Los Angeles; Glenn O. Porter, Studio City, Calif.; Marian M. Rich, Melrose, Mass.; Andree Robinson, Tucson, Ariz.; Clark Sager, South Gate, Calif.; R. E. Schortmann, East Hampton, Mass.; Walter F. Sullivan, San Francisco; H. D. Tefft, Jr., Denver; Claire Webster, Berkeley, Calif.; F. F. Weinard, Urbana, Ill.; R. S. Woods, Covina, Calif.; Rudolph Zirngibl, Rochester, N.Y.

GENERAL SECTION: Miss B. S. Ballard, Montara, Calif.; Harold D. Barney, Denver; H. S. Barsam, Fresno, Calif.; John Bengel, Covina, Calif.; Dr. C. W. Biedel, Bremerton, Wash.; Norman Giudici, Santa Clara, Calif.; R. M. Greer, Joy, Ill.; Bob Haugen, Lynden, Wash.; K. W. Kishpaugh, Saratoga, Calif.; John A. Krimmel, Denver; Mrs. R. F. MacDougall, Westford, Mass.; L. F. Marks, Pittsburgh; D. C. Miller, San Mateo, Calif.; Otto Neuman, Los Angeles; Eugenia Norgaard, Los Angeles; Elizabeth B. Ransom, New York; H. R. Schneider, Spencerport, N.Y.; Alice Stark, Toronto; T. P. Webster, Santa Barbara, Calif.

SPECIAL MEDALS FOR COLOR SLIDES

(Awarded by the Photographic Society of America)

Antoinette Stahl, Chicago—*Lichen Bouquet*

John Benzel, Covina, Calif.—*Mountain Calm*

Technical Publications

The following technical publications were issued recently by the Museum:

Fieldiana: Zoology, Vol. 34, No. 39. *A New Snake of the Genus Tantilla from West Texas.* By Sherman A. Minton, Jr. 1956. 4 pages, 1 illustration. 15c.

Fieldiana: Zoology, Vol. 36, No. 2. *The Distribution of Fishes Found Below a Depth of 2,000 Meters.* By Marion Grey. July 30, 1956. 265 pages, 1 illustration. $4

Fieldiana: Geology, Vol. 11, No. 8. *A Review of the Habitat of the Earliest Vertebrates.* By Robert H. Denison. August 9, 1956. 101 pages. $1.50

ADULT LECTURES—

(*Continued from page 5*)

process of formation. Among these settlers are egrets, herons, cormorants, ibises, spoonbills, snails, crabs, tree-frogs, and insects. Over the years the island is increased in size as tropical storms pile up a fine sand beach. Finally man, who at first shunned it as a disagreeable spot in the sea, comes to it as an island paradise.

April 13—Adirondacks: the Forgotten Frontier

Kenneth Richter

Famed for his documentary films made in many parts of the world, Kenneth Richter in this film and lecture comes home to record the story of his "dream house." He shows and tells the trials and tribulations of finding and restoring a 130-year-old farmhouse "which has nothing to recommend it except spectacular views and a good roof." As shown on the screen, this is a lot funnier than it was as an actual experience, he comments. The locality is near Split Rock, traditional boundary between the two great northeastern Indian tribes, the Algonquin and the Iroquois, which later became the boundary between England and France in the New World. It is an area of magnificent scenery with mountains, forest, wilderness lakes, and pleasant valleys. The wildlife, both on the wing and afoot, is abundant.

April 20—Animals at Night in Color

Howard Cleaves

A technique for taking nocturnal motion pictures of unsuspecting wild creatures in wilderness places was originated by Howard Cleaves about twenty years ago. Cleaves, a pioneer in film-making, began his career in 1913 under the tutelage of Thomas A. Edison. The film on this program has been in preparation for the past eight years. Cleaves found his cast of characters in many places—the Florida Everglades, the Okefenokee Swamp in Georgia, the Mattamuskeet Wild Life Refuge in North Carolina, the Savannah Wild Life Refuge, the Horicon Marsh in Wisconsin, the Montezuma Marsh in central New York, and the Great Smoky Mountains of Tennessee. Among the hundreds of animals caught in their night activities by his camera are Virginia deer, gray fox, black bear, muskrat, skunk, various snakes, many birds, fishes, frogs, and crabs.

April 27—Spanish Interlude

Gerald Hooper

The Spain you might see as a tourist as well as much of the country that few tourists would ever be likely to penetrate, are both presented in Gerald Hooper's color films and lecture. If you have visited Spain, the films are sure to revive cherished memories of Madrid, Seville, Granada, and Barcelona—Valencia, Avila, Salamanca, and Cadiz. An unusual sequence shows the colorful flower festival of Corpus Christi in Sitges where one day each year the streets are carpeted ankle-deep by literally millions of fresh flowers laid in intricate designs. Of interest is the work of girls of Majorca engaged in the elaborate handicraft of embroidering garments with pearls of every hue and color.

AUDUBON SCREEN-TOUR OF GREAT SMOKIES

The Illinois Audubon Society will present the fourth of its current series of screen-tour lectures at 2:30 P.M. on Sunday, March 10, in the James Simpson Theatre of the Museum. C. Harrison Orians, university professor and former ranger-naturalist in the National Park Service, will show his color-film "Great Smoky Skyland" and narrate his adventures in the southern highlands including the Great Smokies and adjoining wilderness areas. The region is noted for its spectacular wildlife including myriad flowers and trees, extremely varied birds, and many kinds of mammals. Also of interest are the old-stock mountain folk who inhabit the region, living in a state of civilization that has many primitive aspects, and retaining native crafts of their ancestors. Admission is free. Members of the Audubon Society and Members of the Museum are entitled to two seats in the reserved section of the Theatre upon presentation of their membership cards.

NEW MEMBERS

(January 16 to February 14)

Contributors

Albert L. Arenberg, Mrs. Claire S. Arenberg, Dr. J. Ernest Carman, Dr. Ernest Lundelius

Non-Resident Life Member

George C. Ruhle

Associate Members

John M. Connery, Kenneth M. Fiske, S. L. Goodfriend, Stanley A. Kaplan, W. E. Thomas, Kenneth R. Turney

Sustaining Member

Mrs. Raymond Fisher

Annual Members

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PALAU—

(*Continued from page 4*)

certain lineages or clans possessing prestige held titles which reflected their senior status in their respective kin-groups. The councils of male chiefs had their female counterparts and the voices of the women were heard in matters of policy. Power was distributed along recognized hierarchical lines and certain democratic features prevailed. For example, a paramount hereditary chief could be overruled by the lesser-ranking chiefs on any given issue. Most issues were discussed interminably prior to the establishing of policy or implementation of action.

Palauan culture has changed much through the years, but the changes it is undergoing at present are the most extensive thus far. The young people today are motivated less and less to learn the old customs. The ways of the Western World are more appealing. The elders deplore this fact. They shake their heads and remark among themselves that times are indeed not what they used to be. Youngsters, they say, do not show the proper respect for their elders, do not listen to the stories of the old days, and do not care about learning the practical crafts of old. Palau has its own variety of delinquency.

Some young people attend high school in Guam and Truk. Here they learn subjects which are vastly different from what they would have learned at home a generation ago. Some individuals are trained as medical practitioners, dentists, or nurses. Others go to school in Hawaii to study advanced education and agriculture. Those who stay at home are learning new ways also. Today free elections are held. All who are over 26 years of age may vote for their own representatives. There is a Palauan legislature which meets twice a year for one-week sessions. In these sessions elected congressmen, magistrates, and chiefs deliberate, debate, and formulate resolutions which, when approved by the American administration, become law. Palauans staff their own police force, they own the major trading store in the islands on a share-holding basis which pays dividends of 20 cents on the dollar per annum, and they teach in schools they support themselves by taxes they levy. The clock cannot be turned back—the Palau of old is lost.

Spring Visiting Hours Begin

Visiting hours from 9 A.M. to 5 P.M. will go into effect at the Museum from March 1 through April 30, an extension of one hour beyond the 4 o'clock closing time observed during the winter months.

SANDERLINGS DEVOUR FISHERMEN'S BAIT

By AUSTIN L. RAND
CHIEF CURATOR OF ZOOLOGY

SANDERLINGS that steal bait from fishermen on the Michigan City pier provide another bit of data helping us to understand how one animal starts depending on another for food. The sanderlings are small whitish sandpipers that migrate each autumn along Lake Michigan and feed along the beaches on all sorts of tiny animals, including washed-up fish. The birds are often very tame. The fishermen, with pole or rod, are after perch, and bait their hooks

Cartoon by Ruth Andris

with tiny minnows that they bring alive in buckets. When fishing is slow they sit for hours, watching their bobbers and occasionally rebaiting. Sometimes when they leave, many dead minnows are thrown on the pier.

For some years I've been aware that sanderlings were often on the pier, along with the fishermen, but only recently did I realize that the sanderlings were actually waiting about and watching the fishermen. One day last fall I saw a sanderling eat a tiny minnow that was lying beside a fisherman, and I sat down to watch. The fisherman, seeing my interest, reached in his bait bucket for a minnow and tossed it a few feet toward the sanderling. The bird at once ran up and ate it. Another time three sanderlings edged past a fisherman to get a dozen or so dead minnows lying near him. One ate five minnows in quick succession, but the others, perhaps replete, only picked at them. Then something happened that illustrates how the activities of one bird can influence another. One sanderling picked up a minnow and ran with it. Another at once gave chase. The first bird dropped the minnow, which the second ate. This competition took place despite there being plenty of other minnows lying on the pier.

I was talking this over with Raymond Grow, of Gary, who regularly watches birds along the lakefront, and he told me of another incident. One fellow in a row of fishermen pulled up his line to rebait its two hooks. He took two minnows from his bucket, laid them by his side, used one to bait the first hook, and then reached for the second. It was gone. A sanderling had taken it, but not knowing this, the man glared at his next-door neighbor suspecting him of theft. But saying nothing he took another bait from his bucket. This happened several times before the man learned what had really happened.

Here we have a small sandpiper that ordinarily picks up small fish along the shore and that is very tame. As soon as a third element is added—man making suitable small fish available—the bird enters into a social feeding association with him. In Michigan City this habit must be comparatively new, for the city has been established only about a hundred years.

Some other birds wait on man for fish and fish scraps—notably gulls that flock about places where fish are being cleaned and fulmars that swarm about the trawlers that dress their catch at sea. Sandpipers ordinarily do not do this, but the Michigan City incidents show that they may. This is another example of the wonderful acuity of birds in taking advantage of any new aspect of their environment in getting food. This is probably how the regular bird-animal association, such as anis and cattle egrets following cows for the sake of the insects they scare up, arose. Chance-encountered benefits were capitalized on, later were sought out, and finally became usual associations. In two species of oxpeckers of Africa, which eat ticks from the cattle, the birds have become completely dependent on the large animals for their food.

JOURNEYS TO 'CAVE MEN' SET FOR MARCH, APRIL

Boys and girls won't need the conventional (well, almost) space helmet to travel thousands of years back in time during March and April at the Museum. To set the mood, perhaps some imaginary time boots would be in order when Museum Journey No. 9—"A Hunt With the Cave Men"—is offered to youngsters any time during visiting hours (9 A.M. to 5 P.M.).

After picking up their travel instructions at either the north or south entrances of the Museum, youngsters can visit, among others, people of the Stone Age of 250,000 years ago, a Neanderthal family, cave artists, and mammoths and wild boars. The cave man hunt is one of a series of Museum Journeys offered to all boys and girls throughout the year. Youngsters successfully completing four journeys receive special awards designating them as Museum Travelers; those fulfilling the requirements of eight journeys can become Museum Adventurers with a special seal added to their awards.

A special "Expedition Cave Man" will be offered to Brownie Scouts, (junior Girl Scout members) and Bluebirds, (junior Campfire Girls) in March and April. On any Saturday morning during the next two months, Brownies and Bluebirds from the Chicago area can attend the Museum's regular spring series of children's movies at 10:30 A.M. in the James Simpson Theatre. After they have seen the program they can begin their own expedition planned by members of the staff of the Raymond Foundation. Written suggestions for follow-up activities to the expedition will be distributed.

GIFTS RECEIVED BY THE MUSEUM DURING THE PAST MONTH

Following is a list of principal gifts received during the past month:

Department of Botany:

From: Holly Reed Bennet, Chicago—462 plant specimens, Wisconsin, Illinois, Indiana; Joshua Daston, Chicago—3 type photographs of *Micropuntia;* Jack Doran, Barrington, Ill.—a *Sagittaria latifolia*, Wisconsin; Chester Hansen, Chicago—3 plant specimens; A. J. Hermann, Chicago—2 hand samples of wood, India; Kendall Laughlin, Chicago—12 *Crataegus* and *Quercus*, Illinois, Indiana, Missouri; Dr. Ursula Levi, Santiago, Chile—12 plant specimens; Morton Aboretum, Lisle, Ill.—74 seed samples; Harold Nogle, Port Arthur, Tex.—4 plant specimens; Orville A. Oaks, Wilmette, Ill.—24 woods of Finland; Peter K. Ogle, Paoli, Pa.—3 plant specimens and a seed sample; Santa Rosa Junior College, Santa Rosa, Calif.—20 Viola, western North America; Dr. Earl E. Sherff, Hastings, Mich.—13 plant specimens; Dr. John W. Thieret, Homewood, Ill.—141 plant specimens, Illinois, Indiana, Michigan

Department of Geology:

From: Prof. J. Ernest Carman, Columbus, Ohio—1,000 specimens of lower Devonian fishes, invertebrates, plants; Claire and Albert Arenberg, Highland Park, Ill.—an Oriental pearl necklace; Roy E. Sturtevant, Chicago—2 Autunites, Redman, Maine; Elmer B. Rowley, Glens Falls, N.Y.—collection of minerals; Ozark Biological Laboratories, Hot Springs National Park, Ark.—a specimen of Pyrite (nodular)

Department of Zoology:

From: William J. Gerhard, Chicago—2,000 reprints on true bugs; Robert Bateman, Toronto—a mammal; Fraser Walsh, Formosa—2 birdskins; Dr. Daniel Cohen, Stanford, Calif.—4 fish specimens, Spain; A. E. Ellis, Epsom, England—a collection of European freshwater clams, Europe; Henry Field, Coconut Grove, Fla.—3 snakes; A. J. Franzen, Chicago—3 pocket gophers; W. C. Freihofer, Stanford, Calif.—29 fish specimens; General Biological Supply House, Chicago—microscopic slides of protozoans

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Members are requested to inform the Museum promptly of changes of address.

Books

NATURAL HISTORY OF BIRDS: A Guide to Ornithology. By Leonard W. Wing. 539 pages, including numerous black-and-white illustrations. The Ronald Press Co., New York. $6.75.

Natural History of Birds follows by only one year the publication of George W. Wallace's excellent *Introduction to Ornithology*. Each endeavors, with varying degrees of success, to summarize our present knowledge of the biology of birds and to explore the more active areas of current investigation. Emphasizing fundamental principles—the why, and not merely the what and the how—both are a welcome relief from the spate of "field guides," popular regional-works, and other relatively superficial bird books that have appeared with almost wearisome regularity in recent years.

Wing's book, in the words of the author, was written for people interested in birds wherever found and was planned as a general reference and as a bird book to accompany a field book or field guide. The implication of comprehensiveness within certain broad limits is largely justified. All major as well as many minor topics relating to birds and their place in nature are at least touched upon, and many are developed at considerable length.

The broad range of subjects that relate to birds and the complexity of present-day research are suggested by the 24 chapter headings. The origin of birds and their place in nature, classification and nomenclature, adaptations, body structure, and other physical attributes of birds are discussed in preliminary chapters. Thereafter, much of the book is devoted to principles of distribution, ecology, territoriality, social behavior, flight, migration, song, courtship, and mating habits. Less fundamental, but also of interest, are the sections on bird protection and techniques of field study. Four appendixes include a useful list of references and an excellent glossary. The book is copiously illustrated with line drawings, diagrams, maps, and charts.

Development of the various topics is uneven, perhaps in keeping with the author's stated purpose of emphasizing those of wide interest. Degrees of contemporary interest are not necessarily correlated with degrees of importance, and one harbors the suspicion that the author tends to be unduly preoccupied with topics dear to himself, sometimes at the expense of others no less important. Specialists, particularly, are likely to be disappointed in some sections of the book and will detect errors both of omission and of commission. These are not easily recognized by the general reader and call for rigorous editing in the future. Greater selectivity in the suggested-reading sections that follow each chapter also would have diminished the more conspicuous defects of this book.

Nevertheless, despite its shortcomings, *Natural History of Birds* adds up to a very creditable achievement in its field if one accepts the view that no single book can be all things to all people. Dr. Wing has succeeded in synthesizing an impressive array of information otherwise largely scattered through the literature. His book will be invaluable to students of birds and general biologists who lack a well-rounded research library.

EMMET R. BLAKE
Curator of Birds

Expedition to Study Active Volcanoes

Dr. Sharat K. Roy, Chief Curator of Geology, left in March on an expedition to study volcanoes in Guatemala, El Salvador, Costa Rica, and Nicaragua, a continuation of a series of expeditions conducted by Dr. Roy for several years. He will study in particular two active volcanoes that have renewed their eruptive activity in the past month, Fuego in Guatemala and Izalco in El Salvador.

THIS MONTH'S COVER

The formidable and, at first glance, unidentifiable creature on our cover is none other than a Murex triremis, one of the most spectacular marine shells.

Shells have been used for ornamentation by nearly all societies, and in many regions they have been collected as art objects. Particularly beautiful and rare specimens have been sold at prices of more than $1,000, and the shell on our cover sold for between $25 and $50 at European shell-auctions in the early days of the 19th century. As always, the law of supply and demand was effective, and as collectors learned how to find living specimens the price dropped until today a good specimen can be purchased for about $3. Most shallow-water species of shells are inexpensive, but deep-sea forms are still rare. At a recent shell auction in Philadelphia, several shells brought more than $100 apiece. News of a new shell collection just received at the Museum and other facts about shells await you on page 3.

Fossil Hunters to Resume Project in Indiana

Field trips of the past several years to quarries in west-central Indiana for the Mecca (Indiana) paleontological research project were resumed in March by Dr. Rainer Zangerl, Curator of Fossil Reptiles, and Dr. Eugene S. Richardson, Jr., Curator of Fossil Invertebrates. Further exploratory work will be undertaken in April and later in the spring. Through the Mecca project the scientists began reconstruction of the story of creatures that lived some 240-million years ago when a shallow sea spread over this part of Indiana. The new studies are for the purpose of tracing the conditions that prevailed in regions to the north and south of the previously explored quarry from which more than 62,000 fossils and fossil fragments were disinterred.

Daily Guide-Lectures

Free guide-lecture tours are offered daily except Sundays under the title "Highlights of the Exhibits." These tours are designed to give a general idea of the entire Museum and its scope of activities. They begin at 2 P.M. on Monday through Friday and at 2:30 P.M. on Saturday.

UNUSUAL PACIFIC SHELLS ADDED TO MUSEUM COLLECTIONS

By ALAN SOLEM
ASSISTANT CURATOR, LOWER INVERTEBRATES

THE MUSEUM has just obtained a collection of shells made by Captain and Mrs. Rudolph Rogers when they were stationed in the Ryukyu Islands south of Japan. Captain and Mrs. Rogers were subsequently moved to Chicago, and as they are now being transferred again they did not wish to pack and carry their collection with them. The 1,000 specimens, many of them carefully cleaned and selected for their perfect condition, represent about 350 species. Though many of the species were previously in Chicago Natural History Museum, the Rogers' specimens are exceptionally large, well preserved, or the only examples for which we have data.

SHELLS—RARE AND BIZARRE

Top row, left to right, are the Argus Cowry and the Map Cowry, highly prized by amateur collectors because of their rarity, and the Court Cone, a deadly poisonous shell. At bottom left is the scorpion shell, a coral-reef dweller, and the long-spined Murex, an enlarged version of which is on our cover.

A few of the shells notable for their rarity or their bizarre shapes are shown in the accompanying illustration. The Map Cowry (*Cypraea mappa* Linnaeus) ranges from South Africa to Japan. The top of the shell is mottled with brown markings which are said to resemble a map. The base of the shell is either white or pink. The Argus Cowry (*Cypraea argus* Linnaeus) takes its name from the numerous brown circles on the top of the shell. Argus was the figure in Greek mythology who had 100 eyes. Both the Map and Argus cowries are highly prized by amateur collectors. Although many obtain specimens, individual shalls of either species with exact locality data are exceedingly rare.

The Court Cone (*Conus aulicus* Linnaeus) has a color pattern of white triangles on a brown background. It is one of the poison-cone shells. Species of the genus *Conus* are equipped with long, barbed teeth and some are known to have poison glands associated with the teeth. The teeth are used like a lance and the poison injected into the open wound. The nature of the poison is unknown, but several human deaths have been caused by the sting of the poison-cone shells. No American *Conus* is known to be poisonous, but some of the larger Florida species may possess a poison apparatus and should be handled with extreme care. Nearly all specimens of the long-spined Murex (*Murex triremis* Perry, formerly known as *Murex tenuispina* Lamarck) have the spines broken, but one received in this collection is an almost perfect specimen. The animal lives in shallow waters and the spines probably serve as protection against carnivorous enemies.

The Scorpion Shell (*Pterocera scorpio* Linnaeus) is one of the most unusual coral-reef dwellers. The young shells are quite different in appearance, since the long spines do not develop until the adult stage. The nearest relatives of the scorpion shells are the conches, members of the genus *Strombus*, and the main ingredient of West Indian conch chowder. All these shells represent either the first or second specimen that Chicago Natural History Museum has from a precise locality.

During World War II many American servicemen found themselves on a coral atoll in the middle of the Pacific Ocean with nothing to do "a'tall." Among the few recreations available were swimming in the lagoons, picking up shells on the beach, or actually hunting the living mollusk on the coral reefs. Attracted by the brilliant coloration and fantastic shapes, the GI's spent many hours looking for shells and gathered quite extensive collections of the common shallow-water species.

The natives of the islands soon learned that "GI Joe" had a lot of money and would pay high prices for even the most common species. The resulting "economic exploitation" of servicemen more than compensated for the exploitation of the natives by the shrewd Yankee traders of the 19th century. The enormous monetary profits of the natives delayed the re-establishment of coconut plantations after the war because the natives had retired on their earnings from selling souvenirs to the Americans.

Many shell collections brought back to the United States represent an investment of many hours in beachcombing and several hundred dollars in cash. Unfortunately, most of the specimens have little market value. Cowry shells that cost the soldier $1 to $3 each can be bought from wholesale shell-dealers for 50 cents a dozen. A very few shells are valuable, but the great majority have little or no commercial importance.

Now, ten years after the end of World War II, many such shell collections are gathering dust in attics and basements and are of no further interest to their owners. Occasionally someone tries to sell one of these collections to the Museum for the same amount that he paid for it during the war, or more. Correspondence with shell dealers soon convinces him of the very small commercial value of shells. We then try to emphasize the scientific value of the material. Only since 1938 has this Museum had an active Division of Lower Invertebrates. Under the curatorship of Dr. Fritz Haas, nearly 700,000 shells and many other invertebrates have been obtained through field trips, purchases of specimens, and generous gifts from individuals. Compared with other leading mollusk collections, mostly started in the 1800's, ours is still relatively small and very few accessions fail to contribute previously unrepresented species.

Scientific study of animals demands not just one specimen of a species but many examples from many localities. Shells of one species may vary greatly in size, color, and shape at the same place, and different forms of the same species may be found in Africa, the Solomons, and Japan. In order to study variation, we need several specimens from each of several different localities. The specimens of even the most common species, if accompanied by exact locality

(*Continued on page 7, column 3*)

PARASITIC WITCHWEEDS THREATEN SOUTHERN CROPS

By JOHN W. THIERET
CURATOR OF ECONOMIC BOTANY

PLANT DOCTORS at North Carolina State College were perplexed last summer while examining specimens of stunted corn. They could find no evidence of nematodes or fungi to account for the condition. However, a graduate student from India noticed, among the corn roots, portions of fleshy, white and purplish, stem-like structures with small scale-like leaves.

Photo by H. R. Garriss

WITCHWEEDS ATTACK CORN
Parasitic witchweeds at base of corn stalk in close association with roots of corn.

These looked, he said, very much like underground parts of the parasitic witchweeds, species of *Striga*, found in many of the warmer parts of the Old World. That this observation was indeed correct was demonstrated by further investigation. In a number of corn fields, an inconspicuous "different" plant bearing small pink flowers was found in places where corn was stunted. In areas of these same fields where the stranger was absent, corn was normal. Study of the root systems of affected corn plants showed that the white roots of the stranger were attached in many places to those of the corn. There could be no doubt that the sickly appearance of the crop was caused by attack of parasitic witchweeds of the genus *Striga* (snapdragon family).

In North Carolina, then, for the first time in the Western Hemisphere, these pests made their appearance.* How and when they were introduced, what species they represent, and how widely distributed they are in this country are questions not yet fully answered. A survey at the end of last year's growing season revealed what may be only a small part of the infestation: witchweeds were found on 112 farms in southeastern North Carolina and adjacent South Carolina.

KINDS AND DISTRIBUTION

There are some 50 species in the genus *Striga*, but only about 10 are of significance as depredators of crops. The most wide-ranging of these is *Striga asiatica*, the mealie witchweed, that occurs over much of tropical Africa and Asia where it is parasitic upon numerous kinds of plants, mostly grasses, including some of the most important crops such as sugar-cane, rice, corn, various millets, and sorghum. *Striga hermonthica* is found mainly on the southern fringe of the Sahara, but it extends as far south as Tanganyika and attacks the same grain crops as the mealie witchweed. Until recently, the tobacco witchweed (*S. gesnerioides*) has not been considered of economic importance, but during the past 20 years this plant, found throughout most of Africa, the Cape Verde Islands, Arabia, and India, has become a serious pest on tobacco in Rhodesia. Besides the mealie witchweed, India has two other species (*S. densiflora* and *S. euphrasioides*) that number sugar-cane among their hosts. In Mauritius, sugar-cane is damaged considerably by *S. hirsuta*, while in Queensland this important crop is attacked by more than one species of witchweed.

LIFE HISTORY

Striga asiatica and *S. hermonthica* are the two witchweeds that have been studied most thoroughly. The following remarks on life history concern this pair but may also be applied at least in major part to other economically important members of *Striga*.

Witchweed seeds—about 1/800 of an inch long—are produced in great numbers in capsules that ripen from the base of the stem upwards. Each capsule contains up to about 900 seeds. As a single plant is capable of producing some 50,000 seeds, it is easy to imagine the staggering number developed in a field where flowering witchweeds are so thick as to give the appearance of a red carpet! The capsules open at maturity, and the seeds, spread by wind or water, eventually get buried in dust or crop debris. Like the seeds of many other parasites, they exhibit the phenomenon of delayed maturation; that is, for the most part they are not ready to germinate immediately after ripening but need a resting period of variable duration. Few germinate during the first year after shedding. After this, the percentage of germination increases rapidly. Witchweed seeds seem to be able to retain viability in the soil for at least 10 years.

Seeds in soil not close to a host root do not germinate, and neither will those exposed in the laboratory to favorable conditions of moisture and temperature alone. If, in addition to these conditions, the seeds are on or very close to a host root, they will start to grow. Such contact or proximity, however, is not necessary because experiments have shown that *Striga* seeds will germinate when moistened with water in which the roots of certain plants—usually hosts—have been growing. This suggests that germination is activated by a soluble substance exuded from the root and absorbed by the seed. Experimental work has fully confirmed this.

PARASITE ENTERS

When germination takes place, the emerging rootlet grows toward the nearest host root. As soon as contact is made, the tip of the witchweed rootlet swells into a bell-shaped structure that tends to clasp the host root. Penetration by the parasite, aided by a substance that dissolves the cell walls of the host tissue, is rapid and ends in the establishment of a complete connection between the food- and water-carrying systems of host and witchweed.

Witchweed seedlings generally attack only the young, rapidly developing roots of the host. On older roots they are seldom found, and there they usually exhibit weak, abnormal development. The only limit to the number of seedlings that can attach themselves to the host seems to be that of space available on the root. In an extreme case 22 witchweed seedlings were observed on ¼ inch of corn root.

Not until four to six weeks after germination do witchweed shoots appear above the soil. During this time, however, the parasite has been developing branch roots that also are attracted to and penetrate roots of the host. The young witchweed stem meanwhile grows slowly and becomes greatly thickened—in comparison with the aerial shoots that will arise from it—and heavily stocked with food reserves in readiness for emergence and flowering. During this underground period, the parasite is entirely dependent upon the host for nutritional and food reserve requirements. It is in this time of total parasitism that greatest damage is done to the host.

Finally the first witchweed shoots appear above ground. Up to this time the parasite has been a dirty white, but now the emergent portions turn green. From this point on, the witchweed is only a so-called water parasite, one that is able to manufacture through photosynthesis its own foods but is dependent upon the host for water and raw

*Members of a related genus *Alectra*, of both Old and New World tropics, are sometimes called witchweeds. Some African representatives are parasitic on legumes, and *A. brasiliensis* attacks sugar-cane in tropical America.

materials. Roots of witchweeds lack root hairs, those structures through which, in self-supporting plants, water and mineral salts are taken in from the soil.

A fortnight after emergence, the witchweed begins to flower. About a month later, the first seed-pods have ripened and begun to shed their contents. The witchweed life-span is about three to four months; when all seed is mature or when the host crop is harvested, the parasite dies. Witchweeds are strictly annual plants; that is, they depend upon seed to carry them from one growing season to the next.

EFFECT ON THE HOST

The results of parasitism by witchweeds can be serious indeed. Corn, sorghum, sugar-cane, and other plants attacked are stunted, often yellowish, and show signs of wilting even when there is ample water in the soil. The sickly appearance is due to the fact that the parasite robs the host of food and water. Since as many as 500 witchweeds may be attached to the root system of a single corn plant, we can understand why the host looks anything but healthy and why it may not yield at all. There is evidence, also, that the parasite may have a toxic effect on its host.

In sugar-cane fields, areas of witchweed infestation are often more or less circular in shape, with a diameter of several yards. Damage, that varies according to the intensity of attack, may be almost imperceptible or may result in death of many canes. Rice, though most often grown under swamp conditions where witchweeds cannot survive, is sometimes raised as a rain-watered crop on slopes of hills as in the Malabar coast of Madras. Here it is a common sight to see, in rice fields, many patches with few or no plants surviving or with sickly plants that contribute practically nothing to the yield. In drought years, entire fields of sorghum may be destroyed by witchweeds. In other years, if the entire crop is not ruined, its yield may be considerably affected in quantity and quality. Similar devastation by witchweeds could be described for their other cultivated hosts. We in the New World can see such devastation in fields in the Carolinas where corn is greatly retarded or killed by the alien predators. In some Old World areas, witchweeds are considered the most ruinous pests of corn.

A number of methods are used to eliminate witchweeds from infested areas. The most primitive cultural-control—an elegant term for weeding—is quite effective if carried out diligently in the initial stages of infestation but is not practicable on a large scale because of the work involved. Shoots can come up any time over a two- or even three-month period of the growing season, and so weeding must continue all this time to insure that no seed is developed. Unfortunately, a farmer will all too often neglect a small outbreak of witchweeds. By the time the patch has grown large enough to give concern, weeding has become a major operation.

Control of witchweeds by means of "trap-cropping" is based upon two considerations. First, in order to destroy

Photo by K. Wilson Jones

SUDAN WITCHWEEDS

Witchweeds in a field of bulrush millet, showing extreme stunting of the host plant.

Striga seeds it is necessary to cause them to germinate, and, second, witchweeds are unable to survive after the death of their host. Trap-cropping, extensively practiced in southern Africa, involves sowing of seeds of a suitable host crop on *Striga*-infested land. The host is allowed to grow about six weeks. During this time many witchweed seedlings have begun their development. At the end of the sixth week, the host is plowed in, as a green manure, to kill both it and the parasite. Then a crop can be sown in time to produce a yield. This crop, the yield of which will be reduced because of late sowing, should be much freer of *Striga*. One trap-crop cannot be expected to do a complete job because (1) seeds of some witchweeds require the variable "after-ripening" period and (2) the roots of one trap cannot reach and stimulate germination of *all* witchweed seeds in the soil. Naturally, then, the percentage of witchweeds eradicated would be much greater if two traps were grown in quick succession and if both were plowed under at the end of six weeks. Better yet are two years of double trap-cropping—the growing of four traps during two seasons—that can almost completely eliminate the parasite. Trapping, therefore, to be really effective, is usually at the expense of at least one yielding crop and is, as has been remarked, "only for the enlightened farmer with capital able to leave land unproductive for a considerable time, and who does not have to raise a crop every year or starve." Plants used as trap-crops for mealie witchweed include corn, teff, and, most often recommended, Sudan grass. Cowpeas, pigeon peas, and velvet beans can be used to trap tobacco witchweed.

CLEANING CROPS

In spite of the fact that certain species of plants excrete from their roots the "factor" that induces the germination of witchweed seeds, these plants either are not attacked by the parasites or act only as quite unsatisfactory hosts, supplying not even enough nourishment to bring the witchweeds to maturity. These "cleaning crops," as they are called, are able to clean the soil of witchweed by causing germination of the seed and then, by *not* serving as satisfactory hosts, effectively preventing replacement of the seed. In the case of *Striga hermonthica*, cleaning crops include peanuts, cowpeas, and hyacinth beans. The *Striga* plants that develop on the roots of these species are small, manifestly ill-nourished, and grow only about ⅓ of an inch above ground. The parasitism, though not highly successful in its effect on the witchweeds, causes a reduction in yield of the cleaning crops. Sunn hemp and alfalfa are able to cause germination of *Striga hermonthica* seeds though these species seem not to be parasitized at all. In Portuguese East Africa, the extension of cotton cultivation is being urged because cotton has been found to be an effective cleaning crop against *Striga asiatica* by which it is not parasitized.

GERMINATION-FACTOR

Very probably the best hope in the battle against witchweeds lies in the cheap synthesis of the "germination-factor." This stimulant has been isolated, and its biochemical nature has been investigated. Perhaps one day its synthesis will be possible and not prohibitive in cost. Then witchweed control will be achieved by the application of the stimulant to the land before a crop is sown. Witchweed seeds would then germinate and, of course, die in the absence of any host roots.

With indifferent success several chemical sprays—including copper sulphate, sodium chlorate, and sulphuric acid—have been used in attempts to destroy witchweeds. Some of these effectively kill emergent portions of the parasite, while others score a double hit, killing both parasite and host.

With the advent of hormone-type herbicides, the prospects for spraying-control of witchweeds have improved. Experimental work with these herbicides has been more

(Continued on page 8, column 1)

'Easily Tamed—Harmless'

WANT A PET? TRY A TARANTULA!

By LILLIAN A. ROSS
ASSOCIATE, INSECTS

SPIDERS STAND HIGH on the list of creatures feared by man and among them none are considered more frightful than the so-called tarantulas. They are the "giants" among spiders, some species attaining a length of 3½ inches. Tarantulas are armed with long and powerful fangs that eject venom with which they can kill frogs and lizards and even small birds, whence comes the name "bird-spiders." Dr. Willis Gertsch reports a Brazilian female that measured 9½ inches (with legs extended) and weighed almost 3 ounces. Our North American tarantulas are much smaller, usually weighing less than an ounce and measuring about 2 inches in length. They are found in this country only in the southwestern states between the Mississippi River and the Pacific Coast, and south of a line extending from the Missouri border to central California. Their length of life greatly exceeds that of other spiders, for specimens have been kept in captivity as long as 30 years. They are lethargic creatures, seldom moving except in quest of food. Their venom is not dangerous to man in spite of their very bad reputation. In fact, they are easily tamed and make fine and utterly harmless pets!

A female tarantula from northern Texas was given to me by the Lincoln Park Zoo about eight years ago. She has been named Hortense by one of my friends. She will sit placidly on my hand, occasionally moving a leg to adjust herself more comfortably. She likes cockroaches for dinner, although she will eat a bit of chopped-up beefsteak or a meal-worm if nothing better is at hand. She pounces on a cockroach with lightning speed, lifting herself on her back three pairs of legs and bringing her front pair of legs and her fangs upward. Then she lunges forward and down, inserting both fangs in her victim. The action is so rapid that the muscle movements can scarcely be followed. One fang is usually inserted on the underside of the cockroach where the skin is soft and the other is thrust in the suture just behind the head. Then the venom is ejected. Hortense stands quietly until the poison has taken effect, and then the meal begins. Spiders cannot chew food; they crush it and then reduce it to a viscous state by pouring over it a glandular fluid, after which they ingest it by means of a sucking stomach, which expands and draws in the food. A tarantula consumes a cockroach in about an hour, leaving only a small mass of hard material. Hortense stops occasionally to rest during the meal.

All spiders slough off their skin as they outgrow it, the number of molts varying with the amount of food the animal consumes and its consequent growth. The spiders found in our Chicago area do not molt after they reach maturity, but the tarantulas, whose life span is much longer, shed the cuticle about once a year throughout their lives. The length of time consumed in the molt varies considerably. They do not eat for several days before the event and are even more sluggish than usual. Hortense molted last April, beginning at eight o'clock in the evening and finishing the process at 3:30 the next morning. She lay on her side in the sand for about two hours after which she turned so that her back was uppermost and remained motionless in that position for some time. Her legs then began to move sidewise, from front to back, and the upper front covering of the body—the carapace—loosened and lifted. Then the skin split down the sides of the abdomen. Finally the legs were slowly pulled out, a joint at a time, and as the third joint came out she turned back on her side, lying thus until the skin has been completely shed including the lining of her stomach and esophagus. The covering of the fangs also was shed. She rolled and stretched for some time after that, finally turning over on her back, where she lay for four hours, until the new covering had hardened. All the hairs and spines of the body-covering were shed with the old skin, but a complete set appeared on the new cuticle.

HORTENSE SITS FOR HER PORTRAIT

Writer Lillian Ross has had tarantula as a "pet" for eight years. These spiders are known to live as long as thirty years. This one came from Arkansas.

NEW WARDROBE

Tarantula molts periodically, shedding entire skin in one piece. Discarded skin is here shown in background. Molting period varies according to climatic and dietary conditions, but normally averages once in ten to twelve months.

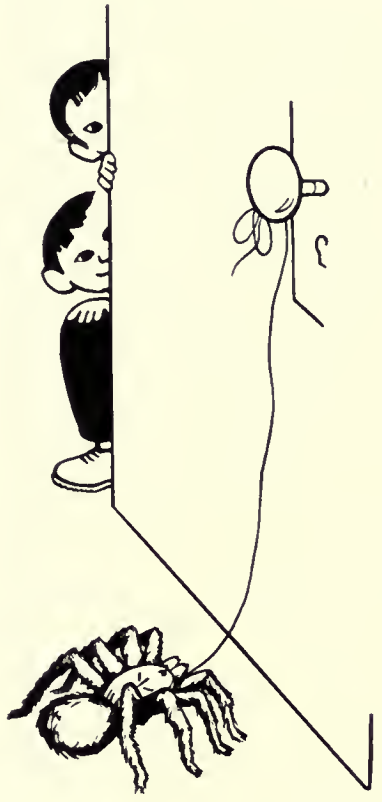
Tarantulas do not eat for several days before and after they molt, and they refuse to eat in cold weather. In their natural habitat, they remain in their burrows, which they sometimes cover. If Hortense is left in her cage in a cold place she refuses food, but if she is placed in a warm room she will eat readily. The female tarantula seldom emerges from her burrow or dwelling-place under a rock except in search of food, for the shelter gives her warmth and protection from her numerous enemies. The male, too, remains secluded until he reaches maturity, when he may be seen roaming around the countryside in search of a mate. The male dies soon after mating, but the female adult often lives for many years. She builds her cocoon deep in the burrow, or beneath the rock; first she weaves a silken sheet on which she lays her eggs; then she covers them with another sheet and fastens the edges together. The number of eggs in a cocoon averages about 800. The young spiderlings emerge in about six weeks and remain for some time in the burrow. Then each one hunts or digs a tiny burrow for itself in which it remains until it reaches maturity—a period of ten years.

Few of the young reach maturity, for their enemies are many. They are often parasitized by flies which develop as maggots and emerge in the spring leaving the tarantulas dead. Rodents, too, often dig into the burrow in search of food, and birds, lizards, and snakes commonly feed on the young as they emerge from the mother's care in search of a home for themselves.

DEADLY ENEMY

The most spectacular enemies of these spiders are the so-called tarantula-hawks—the *Pepsis* wasps—huge, iridescent-blue creatures that lay their eggs only in the bodies of tarantulas. The wasp hovers over the spider, which raises itself for combat. Then the wasp inserts its sting on the underside of the spider's body. The spider struggles violently and the wasp stings it again on the under-side. Soon the tarantula is paralyzed but it does not die. It is hauled to a hole in the ground and a single egg is laid on its abdomen. Then the hole is sealed and the spider is left to provide food for the

larva of the wasp. The helpless creature may live for months, unable to move. Several factors are probably responsible for the tarantula's inability to defend itself against this enemy which is so much smaller than itself. One is its poor eyesight, for its tiny cluster of eight eyes can do little more than discern the difference between daylight and darkness. Another is the position of its fangs—its only weapon of defense—which lie parallel with the long axis of the body. In order to strike at an enemy it must raise



Cartoon by Marion Pahl

its body on its back legs and strike forward and down. But in that instant the wasp slips beneath the upraised tarantula and inserts its sting.

During a recent visit to Cuba, I collected large numbers of tarantulas, aided and supervised by some young Cuban boys who knew well the ways of the local fauna. They would tie bits of finely cut beefsteak on the end of a string and lower it into one of the burrows in the dry and sandy soil. Up would come the tarantula, clinging tightly to its prize and refusing to relinquish its hold even when I turned it over in my hand. I should add that even there, where tarantulas are so common, they have a very bad reputation, and when I handled them so freely the boys were horrified. But they also found it amusing, because one morning I found a tarantula in a harness of yarn carefully tied to my doorknob, while several pairs of brown eyes peered around the corner to see my reaction!

LECTURES ON SATURDAYS CONTINUE IN APRIL

The spring series of free illustrated lectures for adults on science and travel will continue on Saturday afternoons during April. The lectures, which are provided by the Edward E. Ayer Lecture Foundation Fund, are given in the James Simpson Theatre of the Museum at 2:30 P.M. No tickets are required for admission. A section of the Theatre is reserved for Members of the Museum, each of whom is entitled to two reserved seats. Tickets for reserved seats may be obtained by Members at the Theatre on the day of the lecture by presenting their membership cards. Seats will be held for Members until 2:25 o'clock, when the reserved section is opened to the general public.

Following are the dates, subjects, and speakers:

April 6—Birth of a Mangrove Isle
Henry W. Briggs

April 13—Adirondacks: The Forgotten Frontier
Kenneth Richter

April 20—Animals at Night in Color
Howard Cleaves

April 27—Spanish Interlude
Gerald Hooper

AUDUBON SCREEN-TOUR OF JERSEY BEAUTY

If you regard New Jersey simply as a place you travel through speedily on your way between New York and somewhere else and if you see nothing beyond its industrialization, you should hear George Regensburg, who will present his screen-tour in color, "Little-Known New Jersey," in the James Simpson Theatre on Sunday, April 28, at 2:30 P.M.

Regensburg takes his audience far beyond the densely populated urban areas of the state to see beautiful country regions, entrancing wildlife, and historical places dating back to the American Revolution. He will show you rare orchids, ocean beaches, streams and lakes, meadows and dunes. Regensburg, who was born in New Jersey, has assiduously devoted himself to nature study there ever since the age of seven. When not lecturing or making his films, he he teaches at Trenton.

This is the closing lecture in the 1956–57 series presented by the Illinois Audubon Society. Admission is free. Members of the Illinois Audubon Society and Members of the Museum are entitled to two seats in the reserved section of the Theatre upon presentation of their membership cards.

PACIFIC SHELLS—

(Continued from page 3)

data, can provide data for research on geographic variation.

Many authorities believe that specimens from a minimum of seventy-five scattered localities are needed to study adequately the distribution and variation of marine shells. Since more than 45,000 species of marine shells have been described, even the largest collections can use additional material with good locality data. One of the best ways for museums to obtain shells is to gain the co-operation of people such as Captain and Mrs. Rogers, who, after receiving much personal pleasure from their collection, allow it to be permanently housed in a museum and utilized for scientific studies.

MOVIES FOR CHILDREN ON APRIL SATURDAYS

Four more programs of free motion-pictures for children will be presented on Saturday mornings during April in the James Simpson Theatre of the Museum. The programs begin at 10:30 A.M.

Children are invited to come either individually, accompanied by adults, or in groups from schools, clubs, and other centers. They do not need tickets. The programs are the spring offering of the James Nelson and Anna Louise Raymond Foundation.

Following is the schedule:

April 6—Dumbo
(Walt Disney's story of a baby circus-elephant)

April 13—Families of the Far East
Also a cartoon

April 20—Animals at Night in Color
(Narration by Howard Cleaves)

April 27—Fairy Tales
Also a cartoon

GIFTS TO THE MUSEUM

Following is a list of the principal gifts received during the past month:

Department of Anthropology:

From: Lewis Long, Harrison, Ark.—2 boxes of potsherds, Afghanistan; Dr. Matthew Taubenhaus, Chicago—photos of rubbings of 5 of the 6 Chargers of T'ang T'ai-Tsung, China

Department of Botany:

From: Richard W. Russow, Chicago—handsample of lignum-vitae wood

Department of Geology:

From: Miss Frances Glover, Chicago—ruby dust, Burma; Byron C. Marshall, Hot Springs National Park, Ark.—aggregate of quartz crystals

WITCHWEEDS—

(*Continued from page 5*)

or less along two courses. The first, used in Rhodesia, has resulted in good control of aerial growth of *Striga asiatica* on corn. The hormone weed-killer—sold commercially in Rhodesia under the name of "Strigatox"—is applied just as the first witchweed flowers appear in a given plot. These flowers are destroyed, and flower formation by the sprayed shoots is inhibited. Three weeks later, a second spraying takes care of further shoots that have emerged from the soil and commenced to flower. A third spraying, about four weeks after the second, completes the devastation of the parasites. The efficacy of this type of spraying lies in preventing formation of seed. The main drawback of such control measures aimed at destruction of the emergent parts of the parasite is that much damage has been done to the host even before the witchweeds appear above the soil.

The second type of control method using hormone weedkiller was developed in the Sudan and is aimed at the parasite in what are presumably its most vulnerable stages, that is, not only before it appears above the soil but also before it is able to inflict much damage on the host. In the experimental work, hormone weed-killer was applied directly to the soil shortly after sowing a crop—two weeks afterward appears to be the optimum time. This method seems to have three effects: (1) the immediate killing of young, just-germinated and just-attached *Striga* seedlings; (2) a period of unknown duration during which spray residues in the soil either kill the germinating seeds or inhibit their germination; and (3) damage to well-grown *Striga* seedlings which were attached before spraying took place and which, in spite of treatment, may survive to form flowers and fruits. It has been suggested that a combination of the two hormone weed-killer methods—one aimed at emergent shoots as they begin to flower, the other at the young seedlings and germinating seeds—might "give, for the first time, a method of eradication of *Striga* which would pay for itself each year as it progressed."

The breeding of varieties of crop plants resistant to attack by witchweeds is an obvious though not easily and rapidly attained solution to the problem posed by the parasites. Rice growers in Sumatra believe some rice varieties are more resistant than others. Breeding work has been done with maize and sorghum, although in the former no resistant strains have so far been found or developed. In sorghum, on the other hand, the story is different. Here among the numerous strains exists great variation in degree of susceptibility. Some, such as variety "Radar" bred in South Africa, are highly resistant, though not completely immune. It is interesting to note that a particular sorghum strain may be resistant to one species of witchweed and not to another closely related species. Some species of sorghum—*Sorghum versicolor*, for example—are quite unaffected by witchweeds. These, in spite of hybridization difficulties involved, may prove to be important in the breeding of resistant varieties of grain sorghum.

The use of a natural enemy of a plant or animal pest to effect control of the pest is known as biological control. That witchweeds can be combated by this means has been suggested by some students of the problem. In India, the larval stages of certain insects have been observed to feed upon species of *Striga*. Grubs of a leaf beetle seemed especially promising because, in their attack on *Striga asiatica*, they spared "no parts of it, including the stem, leaves, and the pods."

Early detection of witchweeds in a newly invaded area, such as the Carolinas, is very important because control measures can be more easily and successfully aimed at a few isolated outbreaks than at a weed of general distribution. With regard to the foothold now gained by *Striga* in the New World, let us hope that state and federal authorities cast publicity upon the weed and what it can do, and that they and local agriculturists make every effort to eliminate or at least to prevent the spread of this potentially most troublesome foreigner.

'Flower Portraits' Show On Exhibit in April

"Flower Portraits," a collection of watercolors by Miss Ethelynde Smith of Altadena, California, will be an especially appropriate exhibit to usher in the spring season. The paintings, which go on display at the Museum on April 5, will be on exhibition through April 28.

Miss Smith, whose widely acclaimed watercolors of California flowers were exhibited at the Museum in March, 1949, will be represented at the Museum this year with an entirely different selection of paintings. Last month her flowers in watercolor were on exhibition at the Rochester Museum of Arts and Sciences in Rochester, New York. The artist's work has been shown extensively in museums and galleries on the east and west coasts. Paintings to be exhibited include such well-known flowering plants as tulips, peonies, rhododendrons, and lilies as well as lesser-known plants.

NEW MEMBERS

(February 15 to March 15)

Associate Members

Herbert S. Greenwald, Waino M. Kolehmainen, Wesley A. Miner

Sustaining Members

Gilbert R. Calkins, William B. Smeeth

STAFF NOTES

Dr. Clifford C. Gregg, Director of the Museum, recently made a guest appearance on "Adventure Time" over television station WBKB, local affiliate of the ABC network .... **Dr. Paul S. Martin,** Chief Curator of Anthropology, presented a paper at the Conference on Archaeological Identification and the Cooperation of Specialists in Related Disciplines, sponsored by the National Research Council. **Dr. Donald Collier,** Curator of South American Archaeology and Ethnology, and **George I. Quimby,** Curator of North American Archaeology and Ethnology, also attended the meeting held in March at the University of Chicago. Curator Quimby recently made a study-trip to the University of Michigan at Ann Arbor in connection with the Great Lakes project .... **Roland W. Force,** Curator of Oceanic Archaeology and Ethnology, also visited that university, where he inspected the Guthe collection of Philippine archaeological materials .... **Phillip H. Lewis,** Assistant Curator of Primitive Art, and Curator Force attended a program at Northwestern University commemorating the formation of the new state of Ghana in Africa .... **Dr. Karl P. Schmidt,** Curator Emeritus of Zoology, attended meetings of the Committee for Bio-Systematics of the National Science Foundation in Washington, D.C., last month. Dr. Schmidt also spoke before members of the Illinois Committee of the Chicago Association of Commerce and Industry on "Keys to Three Kingdoms," an evaluation of the organization and problems of natural-history museums .... Mrs. Else Burmeister, Librarian of the Milwaukee Public Museum, recently visited the Museum where she discussed general library matters with **Mrs. Meta P. Howell,** Museum Librarian.

Annual Members

Harold W. Alenduff, Clifford Bolgard, George V. Campbell, Julien Collins, Walter R. Daggett, Carl Devoe, Kent W. Duncan, William H. Fehrs, Dr. Albert B. Gerbie, Robert J. Greenebaum, James Grosboll, Laurin H. Healy, Anders E. Hjerstedt, John K. Howard, J. W. Hummel, George Isaacs, John M. Maxwell, Frank D. McCally, Raymond K. Merrill, D. Daniel Michel, Raymond E. Miller, Benjamin F. Morrison, Carroll Dean Murphy, Jr., Henry Perlman, Jack A. Quigley, M. R. Reitman, Richard Revnes, Harper Richards, Douglas K. Ridley, Milton D. Royer, Louis E. Rudin, Andrew Sage, V. R. Savin, Dr. Nathan Schlessinger, Leon N. Skan, Mrs. Mike Tarantino, M. P. Venema, Ernst Dieter Von Meerwall-Srutek, A. T. Wenner, Mrs. Gibson Winter

An exhibit of boas and pythons can be seen in Albert W. Harris Hall.

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CHICAGO NATURAL HISTORY MUSEUM

Bulletin

Vol. 28 No. 5
May 1957

LIPNER JANE
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Members are requested to inform the Museum promptly of changes of address.

GLOTTOCHRONOLOGY: DATING BY WORDS

BY PAUL S. MARTIN
CHIEF CURATOR OF ANTHROPOLOGY

ANTHROPOLOGISTS are interested in the reconstruction of the cycles of culture growths and of man's organic history, or evolution. Without some method of dating, much of our work would be blocked. Lacking dates, we cannot make comparisons of changes in culture, cannot date artifacts or the beginnings of agriculture or of inventions, and cannot show inception of such traits as architecture, writing, and working of metals or the rate and direction of their diffusion. In other words, measuring time is very important for us.

Several methods of dating are being used. Some of the major ones are (1) dating of strata by geological means, (2) dating of bones by fluorine process, (3) stratigraphy, or the position of layers of cultural debris, (4) pollen-analysis, (5) dendrochronology, or the science of dating by means of tree-ring patterns (mostly used in Southwestern United States), and (6) the carbon-14 method, or the radiocarbon method (described in the January, 1951, BULLETIN by Dr. Donald Collier, Curator of South American Archaeology and Ethnology). And there is now a new method called glottochronology (from *glottis*, part of the pharynx, and *chronos*, time). Sometimes this method is called lexicostatistic dating (from *lexical*, pertaining to words, and *statistics*, the science of collecting data and the use of these data as a basis for induction).

Before explaining glottochronology I should like to clear away a common misconception concerning the nature of all languages, written and unwritten.

The opinions expressed by teachers of grammar to the contrary notwithstanding, all languages, including English, are constantly changing. Nothing—no governmental body nor parliamentary rulings—can stop this process unless the language dies out or becomes fossilized, as in Church Latin. What is slang and in bad repute today may become the elegant expression of tomorrow. We may feel that our language is fixed and unchangeable; but actually the changes of the future are, in a sense, already prefigured by obscure tendencies in present speech.

These changes—whether of words, sounds, grammatical elements, or accents—are called *drift*. "All languages move down time in a current of their own making," and this changing pattern is molded by invisible, impersonal, nonconscious influences. Drift is the life of language. Abundant evidence makes it evident that drift has a certain constant direction. Once a language moves far enough away from set standards and develops new features, then it transforms itself into a language very different from the "parent" tongue and becomes in effect a new language. In brief, language varies in space and time, just as do customs, artifacts, and architecture.

LENGTHY PEDIGREE

The pedigree of English, for example, shows that it is a descendant of the Germanic languages (Gothic, the Scandinavian languages, Saxon, Frisian, etc.). Further research has shown that the Germanic languages are distantly related to Celtic, Greek, Armenian, Iranian, Slavic, and Baltic languages and that all of these belong to a more distant "parent" language called the Indo-European.

A few very simplified examples of drift as it has affected English will clarify this concept:

1. A steady reduction of the old Indo-European system of case endings or inflections, such as in the Latin word for *gate: porta, portae, portae, portam, porta*. Today, in English, we have few case endings but say, instead, *the gate, of the gate, to the gate*, etc., although we still say "I gave him the book," *him* being an old dative form for *to him*.

2. An increasing importance of word-order to determine what is subject and what is object, for example: "The man sees the dog." In olden days, the case ending was more important than word-order. Case feeling is determined largely by the position of the word before or after the verb.

3. A tendency under certain conditions for *p* to change to *f*, *t* to *th*, *k*-sound to *h*, and *d* to *t*.

Latin	*English*
pēs	foot
piscis	fish
pater	father
trēs	three
cornū	horn
duo	two

The science of glottochronology is based on linguistic changes, and it therefore forms a method of translating the *degree* of drift into time.

Glottochronology may be defined as a method of dating prehistoric events by the statistical treatment of vocabulary on the basis of the linguistic divergences or degree of drift of related languages (for example, English and Gaelic). The basic assumption underlying this is that all or most all languages, of whatever kind or type, change at a uniform and steady rate. That is to say, the fundamental everyday vocabulary of any language changes at a relatively constant rate, and if this is correct, the divergences of related languages are calculable in elapsed time.

Therefore, wherever we find two languages that by comparative studies can be shown to be the end products of a divergence, sometime in the near or remote past (for example, Eskimo and Aleut, English and Lithuanian, middle-period Egyptian and Coptic, Latin and French, classic Latin and Rumanian), linguists are able to determine with fair accuracy when the first separation took place. This can be conveniently expressed in terms of centuries.

TEST LIST DEVISED

As an example of how this is done, Dr. Morris Swadesh, who devised this scheme, compared modern English with Old English. In order to make this comparison he devised a test list of about 200 everyday, basic, and intimate words—including words

(*Continued on page 7, column 1*)

THIS MONTH'S COVER

The charming painting on this month's cover entitled "Friendly Hippo" is the creation of Janet Lipner, 10, of Chicago, who is one of the students represented in the School of the Art Institute's exhibit of drawings and paintings at the Museum this month. Janet's work, executed in tempera and crayon, was inspired by the hippopotamus exhibit in Hall 22 (Habitat Groups of African Mammals)—after that her lively imagination did the rest.

SEASONAL CHANGES AND ACTIVITIES OF LAKE FISHES

By LOREN P. WOODS
CURATOR OF FISHES

TWICE EACH YEAR, in the spring and early December, a phenomenon occurs on a grand scale in Lake Michigan. This is the semiannual circulation or *turnover*. This occurrence, of far greater importance than the first spring robin or the first autumn snowfall, passes unheralded but not unnoticed by the great majority of Chicagoans. We notice it because of more heavily chlorinated water and we notice it especially in the spring when our lake water from the tap is more turbid than usual or even tastes slightly fishy. The new filtration plants, however, have greatly alleviated the effects on our drinking water resulting from the unusual turbidity produced by the tremendous change that takes place in the lake when its waters give up heat in the autumn months or absorb it during the rare warm still days of early spring.

ELECTRIC WEIR FOR LAMPREYS

Above is an electrically-charged weir blocking river mouth to prevent migration of lampreys upstream. At right center is a trap made of netting for suckers, rainbow trout, and northern pike.

This seasonal period of circulation is of such profound importance to the plants and animals, large and small, living in the lake that their periods of greatest and least activity follow the same rhythm.

It is common knowledge that water is different from most other liquids in that it reaches its point of greatest density at 39.2° F. and then becomes lighter, no longer sinking as it is further cooled until it solidifies at around 32° F. This property accounts for water freezing at the surface first (and only at the surface) when in a large mass, as in a lake, rather than becoming a solid chunk of ice from top to bottom.

In the very early spring the temperature at the surface of the water or just under the ice is close to 32° F. As we measure the temperatures downward they become slightly warmer until near the bottom the temperature is about 39 degrees. The colder but lighter water is on top of the heavier but warmer water.

When the ice melts and the surface water begins to warm toward 39 degrees it becomes heavier and sinks through the colder but lighter water just beneath it, which in turn rises to the surface where it is warmed to 39 degrees before sinking. This process continues until the whole lake becomes the same temperature and therefore the same density. Once the lake water reaches the same temperature throughout, currents caused by the winds stir the waters until they are mixed from surface to bottom. This complete circulation is called *spring turnover*.

The effect of the spring turnover on plant and animal life is significant. During the previous year as plants and animals died and sank into the colder and relatively stagnant parts of the lake, there was a gradual removal of organic materials from the warmer parts of the water. A great deal of this nutriment is returned into circulation by the fall turnover, but it is not used to any great extent until the following spring when warming temperatures bring increased activity. The development of several kinds of small planktonic algae (diatoms, desmids) followed by an increase in minute crustaceans (daphnia, copepods) that feed upon the various algae insures a good food-supply for the hatchling fishes of most species whose first food consists of tiny crustaceans. The spring turnover and subsequent warming also touches off the migrations of many species toward the areas where they subsequently spawn.

EARLY SPAWNERS

There are approximately 100 species of fishes living in Lake Michigan and each month finds one or several of these spawning. The earliest is a fresh-water codfish, the burbot (*Lota*). This species is known to spawn in February and March. Sometimes burbots enter streams to spawn. Because of the low temperature of the water the eggs have a long incubation period and the young may not appear for five or more weeks.

The sculpins (Cottidae), of which there are four species in the lake, are believed also to spawn in the very early spring (March) but nothing more definite is known of them in Lake Michigan. More completely known are the spawning runs of the sea lamprey and the smelt.

SEA LAMPREY

Sea lamprey spawning-runs begin as soon as the temperature of the stream waters is above 40° F., but very few migrate before temperatures reach 50°, usually in late March and early April. As the temperature rises the number of migrating lampreys also increases. The migration occurs almost entirely at night, the lampreys moving upstream until a suitable spawning area of shallow riffles with a bottom of gravel and sand is reached. The distance traveled upstream may be as much as 50 miles but is usually much less (fewer than 20 miles). Spawning activity begins when temperatures are 52–53° F., but the maximum spawning activity occurs at temperatures of 58–60°. After spawning, the adult lampreys die and are washed downstream where they rapidly decay and disintegrate.

The eggs hatch in 10 to 12 days and the larval lampreys leave the nest 8 to 10 days later. These larvae are carried downstream off their riffle where, when the current slackens, they burrow into the soft mud and debris that usually collect in such areas of quieter water. Here they live for the next five years feeding on microscopic organisms sucked from the water passing the mouths of their burrows. During the fifth year they develop eyes, horny teeth, and the enlarged fins of adults, and in the early spring they emerge from the mud, drift downstream, and enter the lake where they become parasitic and feed on the blood of fishes.

Spawning-migrations of smelt occur at about the same temperature and therefore at the same time of year as those of the sea

lamprey. Smelt also migrate at night, and so large numbers of smelt and lampreys enter the streams together, but the lampreys proceed farther upstream, the smelt usually going only a few hundred yards. A sand and gravel bottom is preferred for spawning by both smelt and lamprey but, because the smelt do not require a riffle or downstream mud-bottom pool, the two forms utilize different geographical parts of the stream. Another difference is that smelt leave the streams the morning following their spawning (see BULLETIN, March 1954)

Photo courtesy Iowa State Conservation Commission

EARLY SPAWNER

Burbot, a fresh-water codfish, spawns in February and March.

but the migrating lampreys die there. Moving inshore along with the smelt, which they resemble, are the trout perch (*Percopsis*). They enter streams either in the day or night and gather in quiet water behind obstructions such as boulders. They spawn in turbid water over a rocky bottom. The alewife, a recent invader in Lake Michigan, has spawning habits similar to the smelt, but its spawning run begins a week or two after that of the smelt has ended.

Entering the streams with the migrating smelt and lampreys are large numbers of white suckers that migrate to distant headwaters beyond even the lamprey grounds, as do the rainbow trout from the lake. Still another lake fish entering streams in the early spring for the purpose of spawning is the northern pike (*Esox*) that may begin its migration as early as March 1, even before the ice leaves the streams. These fish move to very shallow waters near the stream source and, at the time of floods, leave the stream channels and spawn over the flooded swamps and bottom lands.

Many of the lake species do not normally leave the lake to spawn, as do the half-dozen species just discussed.

PERCH

The abundant yellow perch (*Perca flavescens*) is the fish most anglers are seeking when fishing along the lake shore during the summer. Normally living in shallow waters and open bays, the perch make their spawning runs close to shore in late April or early May when the water temperature is 44–54° F.

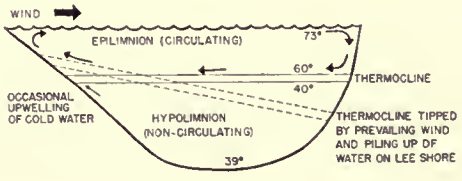
The perch eggs are embedded in long flattened gelatinous ribbons. The spawning female seeks aquatic vegetation, submerged brush, logs, or pilings where the sticky egg-ribbon is attached. Very often the eggs are plastered all over the commercial fishermen's submerged nets. The eggs are fertilized by the 15 to 20 males that follow the female as she deposits her eggs.

The nursery grounds of the young perch are shallow bays and weedy areas among pilings or close to piers. Schools of tiny perch numbering in the millions can be seen in late July or August just before dusk along the seawalls of Grant Park.

Probably the most numerous of all fishes in Lake Michigan is the emerald shiner (*Notropis atherinoides*), the fish most commonly used as a bait minnow by the lake-front fishermen. Its swarms outnumber the combined population of all other species in the lake. During December and January of each year the emerald shiners congregate in protected bays and in the mouths of rivers. In the spring huge unbroken schools can be seen along the promontories and breakwaters, moving just beneath the surface. The school may stream by for several hours or all day. The green bodies, with purple iridescent stripes down the middle of the back, flash past and are replaced by more bodies in an unending stream several feet wide and as deep as it is possible to see (2 feet). The schools later break up into spawning groups of 50 to 300 individuals and these small groups move around the open lake. Pairing and spawning occurs in mid-water during June or July.

THERMAL STRATIFICATION

As the temperature of the surface water rises above 39 degrees during hot late-spring days, these surface waters are no longer the same density as the colder deeper waters and therefore do not mix readily. Gradually a stratification is brought about with warmer lighter waters in the upper layers. Below this is a narrow vertical distance where the temperature of the water falls sharply and below this a mass of water that is still 39 degrees (*see diagram*). By the end



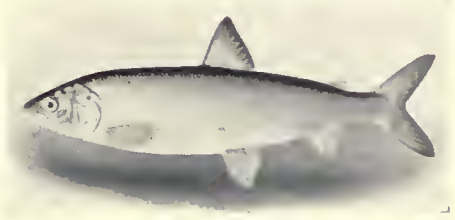
of May the demarcation between the upper warm layer (epilimnion) and the lower cold layer (hypolimnion) has become very narrow, only a few feet in thickness. This line of demarcation, the region where the temperature gradient is greatest, is called the *thermocline*.

Once the thermocline has narrowed, the difference in density is of such magnitude that little mixing occurs between the upper and lower layers. The lower cold layers are shut off from any source of heat so that they remain cold. The upper layer circulates freely, growing warmer, and the thermocline sinks lower and lower (80 to 120 feet below the surface) as the summer advances. Captain Jacques Cousteau, the undersea explorer, has said that the difference in density is sufficiently great that a skindiver in an aqualung can float upon the upper face of the thermocline as ordinary swimmers float at the lake surface. If a strong west wind should blow for several days, much of the warm water would be drifted from the Illinois shore toward Michigan. There it would pile up, depressing the thermocline on the lee and causing the cold waters to come nearer the surface on the windward. Conversely, during periods when cold northeast winds make conditions for visiting beaches most unpleasant, Lake Michigan water is found to be unusually warm.

In Lake Michigan the bottom waters do not become completely stagnate or depleted in oxygen, and so some kinds of fishes such as lake trout, the chubs (*Leucichthys*), smelt, burbot, and deep-water sculpin can live there most of the time. Others like the emerald shiner, perch, and alewife do not normally enter the hypolimnion.

FALL SPAWNING

The definite thermal stratification lasts in Lake Michigan until December, although as the surface waters gradually cool and days grow shorter in autumn a number of deep-water species of fishes move from the cold hypolimnion to spawn in shallow water.



LATE SPAWNER

Deep-water chubs, such as the one above, spawn in the fall. They include the longjaw, shortjaw, kiyi, and blackfin.

Lake trout spawn in late September through October on rocky shoals at depths of less than 20 fathoms. These are followed by whitefish, the several kinds of chubs such as kiyi, longjaw, shortjaw, blackfin, and the lake herring. The eggs of all these fishes spawned in the fall develop slowly in the cold waters of the lake and hatch at various times during the winter or the following spring (April or May).

The lengthening cold clear nights of autumn cause the warmth of the lake to be slowly lost by radiation. The epilimnion cools to about 39 degrees and the gales of winter are able to mix the now scarcely different upper and lower layers. This is the period of *fall turnover*. The water of the lake once more circulates from top to bottom and continues in this mixed condition, being constantly stirred by the fierce winds of winter storms. During this period the strong currents are felt in all but the deepest holes.

MUSEUM INTERPRETED IN ART STUDENTS' SHOW

Natural-history exhibits as interpreted by individual artists from eight-year-olds to adults will be presented in the annual show of drawings and paintings by students from the School of the Art Institute of Chicago.

'KANGAROO CONVENTION'

This striking pastel and India-ink drawing, shown this month at the Museum with other work by students of the School of the Art Institute, is by Clyde Ball, of Crown Point, Indiana.

The exhibit will be held from May 3 through May 31 in Stanley Field Hall and in the North Corridor on the Ground Floor of Chicago Natural History Museum.

The exhibition this year, which is the largest held since the student shows began at the Museum in 1946, will feature 82 works executed in nearly all media by the students in the Junior School (which includes elementary and high-school students) and in the adult professional day-school. Judges for this year's show were Gustaf Dalstrom, Artist in the Department of Anthropology, and Marion Pahl, Staff Illustrator, who chose the works to be exhibited from drawings and paintings first selected by instructors from the School of the Art Institute who have conducted classes at the Museum during the past year. They are: Miss Barbara J. Aubin, Harry Breen, Mrs. Berta Caul, Herbert B. Forman, Miss Marion Lukens, Miss Dolores Nelson, Mrs. Dorothy Novotny, Jasper M. San Fratello, Miss Ethel Spears, and Joseph S. Young.

The aim of the Art Institute classes at the Museum is to encourage the student to express his impressions of the exhibits he sees, not merely to represent them as accurately as possible. Animals are the most popular subject-matter, especially with the younger students. The younger students also seem impressed with museum atmosphere and the people who come to see the exhibits. Besides quality of form, design, and color, viewers will discover in the show a generous amount of sincerity, warmth, and humor.

"Most of my students make research drawings in a realistic manner while in the Museum and later convert the material into many different dimensions, techniques, and media," says Miss Ethel Spears whose adult class is represented in the show. "These research drawings may be the inspiration for illustrations, posters, textile patterns, wallpaper designs, serigraphs, ceramic sculpture, pottery, enameling on metal, collage, easel paintings, and murals."

Over the years, these classes have sent forth many students who have achieved notable professional careers.

Visiting Hours Extended for Summer Season

Effective May 1 and continuing through September 2 (Labor Day) visiting hours at the Museum are extended by one hour. The Museum will be open daily, including Sundays and holidays, from 9 A.M. to 6 P.M. At the end of this period, hours will revert to 9 A.M.–5 P.M.

The Museum's collections from ancient China in George T. and Frances Gaylord Smith Hall (Hall 24) include an especially noteworthy representation of Han pottery, Sung pottery and porcelain, and Buddhistic and Taoist sculpture.

ANNUAL SCIENCE FAIR AT MUSEUM MAY 18

Chicago-area students with a scientific turn of mind, from grades 6 through 12, will gather in Stanley Field Hall to exhibit their accomplishments when the annual Chicago Area Science Fair is held Saturday, May 18, at the Museum.

The show, which will be open from 9 A.M. to 5 P.M., is sponsored by the Chicago Teachers Science Association and is quite distinct from the Chicago Public Schools Student Science Fair, which was held in April and was limited to students in the Chicago public schools. All students in public, private, and parochial schools or members of youth organizations within a 35-mile radius of the city are eligible to enter. Prizes and awards will be made at each grade-level from 6 through 9 and in subject-areas from grades 10 through 12.

STAFF NOTES

Dr. Theodor Just, Chief Curator of Botany, attended the Conference of Editors of Biological Journals held last month in New Orleans under the auspices of the American Institute of Biological Sciences and the National Science Foundation .... **Dr. Rainer Zangerl,** Curator of Fossil Reptiles, and **Dr. Eugene S. Richardson, Jr.,** Curator of Fossil Invertebrates, spent a week last month on a field trip in Mecca, Indiana .... **Loren P. Woods,** Curator of Fishes, spoke on conservation last month before the students of Hyde Park High School .... **Henry S. Dybas,** Associate Curator of Insects, recently presented a paper on the periodical cicada before the North Central Branch of the Entomological Society of America in Des Moines, Iowa.

NEW MEMBERS

(March 16 to April 15)

Associate Members

Elliott Donnelley, Sigmund W. Lewendowski, George Lill II, J. W. O'Neill, Seymour Oppenheimer

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PREHISTORIC HUNTERS— UPPER GREAT LAKES

By GEORGE I. QUIMBY
CURATOR OF NORTH AMERICAN ARCHAEOLOGY AND ETHNOLOGY

ABOUT 18,000 YEARS AGO the climate of the whole world was much colder than now and the upper or western Great Lakes region was buried under masses of ice hundreds and hundreds of feet thick. This was the climax of the Wisconsin glaciation, the last of the great continental glaciers. Although the climate may have become slightly warmer and the ice may have shrunk an estimated 10 per cent, no large climatic change occurred until at least 13,000 years ago. After this time the climate became increasingly warmer and the glaciers eventually melted, raising the world's sea-level about 200 feet.

This glacial retreat in the upper Great Lakes area began about 11,000 B.C. or shortly before. At first the retreat was slow and interrupted by temporary advances of the ice front. But after about 8500 B.C. deglaciation or retreat of the ice was very rapid. And by 5000 B.C. the basins of the upper Great Lakes were entirely free of ice.

LIFE EMERGES

As the ice retreated northward, plants, shrubs, and trees moved into the region. This process is aptly described by the late Frère Marie-Victorin, who wrote as follows: "And now we imagine the aggressive types of the so-called Canadian spruce forest coming up north, striding over moraines and ice-polished slopes, surrounding the nunataks and invading those secluded rock-gardens of the past. Indeed a great biological picture, this onward march, spread on the geological time-scale! In America, at least, there was no frowning Macbeth on the wall to watch Birnam woods coming up to Dunsinane. But nevertheless on and on came the 'moving groves.'

"First came those ever ready pioneers: the black spruce and the white spruce, and the balsam fir, and the larch, and later the stately pines. Then followed the aspens and the birches, the alders and viburnums. And the sugar maple took possession of the well-drained moraines alongside the valleys, and the hemlock fought its way among the deciduous trees. Meanwhile had come the wiry grasses and the coarse sedges, the legions of goldenrods and asters, and the hundreds after hundreds of herbaceous or shrubby plants."

As the vegetation spread northward following the retreating glaciers, the animals spread northward following the vegetation.

ELEPHANTINE CREATURES

First came the mammoths and mastodons, particularly the latter, and apparently with them were giant beaver, deer, elk, and caribou. In the Lake Huron basin there seem to have been whales and perhaps walruses. As will be shown subsequently, the deer, elk, and caribou were present in the region after the mastodons had left it.

As the animals moved into the upper Great Lakes area so did people, the Indians. First came the paleo-Indians who used fluted points of chipped stone for spearing large animals such as mastodons. Next came the hunters with their lanceolate blades of Yumoid style and the paleo-Indians who worked the quartzite quarries in the northern part of the area. Then came the Old Copper Indians who made many of their tools and weapons of copper and hunted the elk and barren-ground caribou. And finally there appeared the late archaic Indian hunters with their wood-cutting tools of ground stone.

Of the first comers, the paleo-Indians who used the fluted points, we have no direct evidence other than surface finds of fluted

MIDDLEWESTERN WEAPONS, B.C.

Weapons like these Middlewestern fluted points of chipped stone have been found in the upper Great Lakes region. They belong to a period from about 10,000 B.C. to 7000 B.C.

points. No actual dwelling sites have been found and excavated in the upper Great Lakes area. However, the distribution of the fluted-point finds provides an excellent clue to their age. Fluted points (Clovis style) have never been found north of the Port Huron Moraine and never on the lakeward side of the Algonquin beach deposits. This distribution suggests that the fluted point could not have been in the area before very late Cary times and had gone out of use by the end of the Lake Algonquin stage. In terms of radiocarbon-dated events and geochronology, this period seems to have lasted from about 11,000 or 10,000 B.C. to about 7000 B.C. This dating is in general agreement with data from actual excavation of fluted-point sites outside of the Great Lakes area.

SPRUCE-FIR DOMINANCE

The period of fluted points is also the period of spruce-fir dominance in the forest cover and the period encompassing radiocarbon-dated mastodon remains. The information available suggests a functional relationship involving spruce-fir dominance in forest cover, mastodons, and fluted points. In the western United States the same kind of fluted point is associated with the hunting of mammoths.

The paleo-Indians who used various kinds of lanceolate points and the paleo-Indians who worked the northern quartzite quarries were in the region sometime after the end of the Lake Algonquin stage and before the end of the transition from Lake Algonquin to Lake Chippewa-Stanley stage. In terms of years this would be from about 7000 B.C. to about 5000 B.C. or slightly later. This was a time of declining spruce-fir and increasing pine in the forests of the area. Although there are at least three well-excavated sites of this period, there is no available information concerning specific animals hunted. Contemporary Western Indians using similar lanceolate points hunted the bison both of modern type and types now extinct.

There is a reasonable amount of information concerning the Old Copper Indians who lived in the region between about 5000 B.C. and about 3000 B.C. or 2500 B.C. First of all, the locations of many of the Old Copper finds as well as some of their sites indicate that they are later than Lake Algonquin and earlier than Lake Nipissing. Moreover, this

OLD COPPER CULTURE ARTIFACTS

Representative of the Old Copper culture (4500 B.C. to 3000 B.C.) in the upper Great Lakes region are top row, left to right, a crescent-shaped knife and a wedge, and bottom row, two spearpoints.

stratigraphic chronology is confirmed by actual radiocarbon dates on one Old Copper burial site.

DOGS ON SCENE

During this period the pine forest reached its climax in southwest Michigan and oak-chestnut and grasses began to increase. Some animals associated with this period and/or the Old Copper culture were barren-ground and woodland species of caribou, elk, deer, and buffalo, and perhaps horses of a type now extinct. What is probably the

first appearance of the dog occurs in this period.

The late Archaic culture more or less coincident with Nipissing and early post-Nipissing times, about 2800 B.C. to 800 B.C., is known largely from scattered finds in the upper Great Lakes area and from detailed excavations of sites in adjacent regions. The Indian bearers of this culture lived by hunting, as did their predecessors in the region. What is distinctive about them is their use of ground and polished-stone tools and weapons and their emphasis upon woodworking tools such as axes, gouges, and adzes. This woodworking assemblage seems to correlate with the development and climax of the oak-hickory forest in the upper Great Lakes region. The climate of this period was the warmest since preglacial or interglacial times and, with the termination of the Nipissing and early post-Nipissing stage, the climate was essentially as it is today.

It seems reasonable, however, to believe that as the ecological zones moved northward some of the Indian hunters adjusted to life in these zones moved northward too. Thus the recent Indian hunters of the pine and spruce forests of northern Canada represent a mode of life under conditions somewhat similar to those in the Lake Michigan region thousands of years ago.

DATING BY WORDS—

(*Continued from page 2*)

such as *all, and, animal, ear, to eat, eye, far, fat, foot, heart, I, to kill, mouth, skin of a person, sleep, tonguc, tooth, water, woman.*

Then he compared these words with the Old English versions (about A.D. 950). By taking into account normal phonetic changes, he found that the agreement between old and modern English words was 85 per cent. The elapsed time between Old and Modern English was 1,000 years. That is to say, there was a "retention index" of 85 per cent in modern English when compared to Old English of A.D. 950. Therefore, Swadesh actually discovered the rate of change—i.e., quantified the assumed rate of change.

Thus, the percentage of retained vocabulary gives an index of the time that has elapsed since the separation. Anthropologists have gone on to make similar comparisons and studies of other languages where historical materials are abundant and go back as far as 4,000 or 5,000 years. Crucial cases were chosen in linguistic families in which there occurred ancient and sometimes now extinct languages preserved in written form, such as in the Semitic-Hamitic family (ancient Egyptian, Coptic, modern Hebrew and ancient Hebrew, in which most of the Dead Sea Scrolls were written; modern and ancient Arabic), in the Indo-European languages such as Classical Latin, Italian, Spanish, French, English, Greek, Rumanian, and in Chinese, ancient (A.D. 950) and modern.

After several trials and many complicated mathematical-statistical manipulations linguists have worked out a provisional rate of decay of words, or morphemes (shortest meaningful unit, such as *anti-* or *is*), per 1,000 years. This is called a chronology for lexical history or retention index or glottochronology.

Since Dr. Swadesh's first articles appeared, several anthropologists have used his suggested methods for placing an approximate date on various linguistic emigrations or separations. Before illustrating this process I should say that since the anthropological linguists who use lexicostatistic dating are prudent folk and wish to be conservative in their time estimates, they use an "index of retention" that takes into account possible overlapping of cognates (*father, vater, pater*) and allows for a generous margin of possible errors of various types.

If one knows the number of cognates in two concurrently existing languages, one might use a table such as this to determine the length of time that has passed since the two languages split from a common source.

Time expressed in thousand-year units	Percentage of persistence or of survivals of cognates (words having in common the same word or root but differentiated by phonetic changes—as *ten, zehn, decem*) (r (%) = 85)
1	72
2	52
3	37
4	27
5	19
6	14
7	10
8	7
9	5

To illustrate the practical uses of glottochronology, I shall cite one or two examples:

ARRIVAL OF NAVAHOS

For some time, we have known that the Navaho language was derived from the Athapascan language, still spoken today in northwestern Canada. We have recognized the fact that the Navaho left their northern homeland for reasons unknown and trekked southward to settle in what is now Arizona and New Mexico. But how long ago did that take place? Archaeologists were uncertain about the arrival date of these people but had guessed that they might have entered the Southwest as early as A.D. 1000. We know from tree-ring dates that they were surely there about A.D. 1500.

These were apparently not bad estimates, for by glottochronology based upon comparison of Navaho with northern Athapascan languages we learn that the Navahos probably began to enter the Southwest about A.D. 950 and continued to trickle into that area until A.D. 1350 or thereabouts.

If the Navahos continued to leave their homeland and to migrate into the Southwest about 4,000 miles from their homeland for about 400 years, we may have the answers to several puzzling aspects of the life, customs, and traits of the prehistoric Navaho people.

Again applying glottochronology to the problem of how long the Yukon Eskimos have been separated from the Greenland Eskimos, we find that 1,000 years is the probable answer.

And last, archaeologists have assumed after much digging, that the Aleut Indians had formerly occupied the Bering Strait region and had shared in that culture at some distant date. Glottochronology gives us an estimate of about 3,000 years for the separation of the Aleuts from the Bering Strait Eskimos. This date coincides almost exactly with a radiocarbon date of about 3,000 years ago for the earliest known Aleut site on Umnak Island in the western Aleutian Islands.

Will glottochronology have any bearing on the work of this Museum's Southwest Archaeological Expeditions? Yes, perhaps. If we can make any shrewd guesses as to what language the Mogollon folk spoke, where they went, and what their descendants are speaking today, we may be able to conjecture a date at which they split off from the main group and learn something of their original habitat. Already a study has been made that leans in this direction, but more linguistic work must be done before we can make any statements.

It should be remembered that glottochronology rests on an assumption that is not yet proved, namely: that languages of all types change at a fairly steady and uniform rate. But more applications of it will prove, disprove, or modify the assumption. It is a tool to be used along with as many other kinds of data as possible.

I have presented here a very brief and perhaps over-simplified version of this recent development. Since the subject is new and highly technical, I have had to omit much. For anyone interested in following up the subject, I suggest he read "Towards Greater Accuracy in Lexicostatistic Dating" by Morris Swadesh in the *International Journal of American Linguistics* (volume 21, no. 2, April 1955, pp. 121–137). In this article is a fairly complete list of references on the subject.

Insect Collecting to Begin

A field trip to collect minute insects from forest floors on the Northwest Pacific Coast will get under way about May 15, with Henry S. Dybas, Associate Curator of Insects, in charge. From headquarters in the biological laboratories of the University of Washington, at Seattle, Dybas will investigate various localities in Washington, Oregon, and British Columbia. The work is in continuation of a research project in which he has been engaged for some time.

SEASONED TRAVELERS

Janet Mangold, 8, of Chicago, accepts an award from John R. Millar, Deputy Director, honoring her as a Museum Adventurer while other qualifiers, Boyce and Carol Brunson, 8 and 9, of Chicago, and Konrad Banasak, 12, of Whiting, Indiana, await their turns. The four received their certificates in recognition of their successful completion of eight Museum Journeys, or make-believe travels through the Museum. Nineteen other boys and girls received Museum Traveler Certificates honoring them for four Journeys successfully completed at the time the Adventurer awards were made, March 30.

The Museum Traveler program, inaugurated for children two years ago, is under the direction of the Raymond Foundation. To complete the Journeys boys and girls, following an instruction sheet that routes them on their trip through the Museum's halls, must answer correctly questions about exhibits they have seen on their travels. The next Museum Journey, "Birds," will be held during July and August. Journeys are available to all boys and girls at any time during Museum visiting hours.

Books

SNAKES AND SNAKE HUNTING. By Carl Kauffeld. Hanover House, New York. 266 pages, 14 photographs. $3.95.

Snakes and Snake Hunting is the best account in popular language of the emotional aspects of an interest in snakes by which the somewhat extraordinary sport of snake hunting and snake collecting is lifted out of the ordinary and brought into direct, if somewhat loose, relation with the science of herpetology. It is difficult for this reviewer to be objective or critical about either the author or his subject. Carl Kauffeld and I belong to a select and strictly limited group of herpetologists, composed of the ex-assistants of the late Gladwyn Kingsley Noble (I am the senior member). For this reason the author's accounts of snake hunting in the New Jersey Pine Barrens have a nostalgic charm to me over and above the intrinsic interest of a vivid description of one of the most ecologically distinctive areas in the United States. G. K. Noble and I had tramped those sands and bogs years before Carl Kauffeld's association with the American Museum and the Jersey Barrens began. Other chapters have great regional appeal to me, for I have hunted snakes on the Ajo Road in Arizona and have camped in the Huachucas. Thus I envy the author his snake-hunting experience in areas where I have not been—such as Florida and South Carolina.

The sport of snake catching is not without its element of real danger. This lifts it into a level of excitement and of challenge to one's competence in dealing with venomous snakes. It is not without direct relation, also, to scientific studies, as one learns more and more about the rich snake-fauna of North America or sees in vivid life a creature previously known only from a dead museum token. I came to appreciate snake hunting as having something of the quality of big-game hunting (with a greater element of personal danger and without its destructiveness) in association with J. E. Johnson, Jr., of Waco, Texas, whose career was ended by the bite of a rattlesnake. *Snakes and Snake Hunting* gives excellent expression to this aspect of the snake-hunter's outdoor experience. Ed Johnson would have recommended one addition to Kauffeld's list of snake-hunting equipment, namely a small crowbar. The small crowbar he supplied me with on a memorable occasion was an unbendable steel driveshaft from a Ford car; it was the small one because it was a half-inch shorter than his own.

Kauffeld's book includes much information about North American snakes, some hitherto unpublished. It has the great merit of cautioning against unnecessary collecting, with the plea that unless a specimen captured is to find a place in a zoological garden, or in a museum collection, or is to be given proper care in one's private possession, it should be released.

This is a book of literary merit, with a vivid quality of personal experience that has an appeal to the great fraternity of herpetologists, which includes the boy who keeps a snake in a box as well as the museum curator.

KARL P. SCHMIDT
Curator Emeritus of Zoology

Daily Guide-Lectures

Free guide-lecture tours are offered daily except Sundays under the title "Highlights of the Exhibits." These tours are designed to give a general idea of the entire Museum and its scope of activities. They begin at 2 P.M. on Monday through Friday and at 2:30 P.M. on Saturday.

GIFTS TO THE MUSEUM

Following is a list of the principal gifts received during the past month:

Department of Anthropology:

From: Evett D. Hester, Jeffersonville, Ind.—Philippine ceramic collection; Mrs. Webster Plass, London—African mask headdress, Baoule, Ivory Coast, West Africa; Mrs. C. L. Schmidt, Chicago—clothing, Chungking, China; Clyde A. Schultz, Chicago—collection of archaeological specimens; Sidney A. Teller, Chicago—2 San Blas Indian appliquéd textiles, Panama; D. R. Thurow, Champaign, Ill.— 86 African ethnological specimens, Baoule, Ivory Coast, West Africa

Department of Botany:

From: Holly Reed Bennett, Chicago—799 unmounted plant specimens, Wisconsin, Indiana, Illinois; Missouri Botanical Garden, St. Louis—100 ferns, Peru; Simon Segal, Chesterton, Ind—*Lycopodium obscurum;* Earl E. Sherff, Hastings, Mich.—5 photographic prints, 3 negatives

Department of Geology:

From: Mrs. Walter Douglass, Chauncey, New York—3 silicified tree-ferns, *Septarian* concretion; Mrs. H. Healy, Chicago—mineral and rock specimens, Victoria, Australia; Ronald E. Peters, Chicago—fossil stem of a tree-fern

Department of Zoology:

From: Glen E. Haas, Madison, Wis.—11 fleas, 22 adult and immature ticks; Harry Hoogstraal, Cairo, Egypt—19 bat ticks; Hermano Niceforo Maria, Bogotá, Colombia—4 turtles; Pacific Salmon Investigations—2 fishes; Mrs. J. S. Rogers, Chicago—a sea-turtle, Riu Kiu Islands; Miss Lillian A. Ross, Chicago—a frog, 6 lizards and a snake, Cayman Islands; Raymond E. Stadelman, Colombia—a caecilian, 4 frogs, 6 lizards, 27 snakes; Dr. Norman Wilimovsky, Stanford, Calif.—123 fish specimens, Alaska; A. E. Ellis, Epsom, England—fresh-water clams, Europe; Ray Grow, Gary, Ind.—a bat; David Kistner, Chicago—423 beetles, 861 butterflies, 1,392 moths, 216 miscellaneous insects, United States

Director's Annual Report To Be Distributed

The notable increase in the use of Chicago Natural History Museum as a classroom adjunct by groups of elementary-school pupils and students from high schools, colleges, and universities is stressed as a major development in the Annual Report of the Director to the Board of Trustees for 1956.

The Report, copies of which will be sent to every Museum Member in the next few weeks, is a volume of 155 pages with 24 illustrations. In addition to the progress of the Museum's educational activities, the Report presents detailed accounts of expeditions, scientific research conducted in the various departments, additions to the exhibits, accessions, the work of the Library, maintenance of the building, and the institution's finances.

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Bulletin

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Members are requested to inform the Museum promptly of changes of address.

YOUNGSTERS DESCRIBE REACTIONS TO MUSEUM

Throughout the year the Raymond Foundation receives a steady stream of letters from youngsters who have visited the Museum with organized groups and have had the tour services of one of the seven Raymond Foundation lecturers. As a result of these letters there is, in Stanley Field Hall, an interesting corner where letters from boys and girls are posted from time to time for the enjoyment of the public.

For the entertainment of our readers, here are a few observations of the young critics from letters now on display:

From a little boy in Gary, Indiana:

"I thought that everyone was really nice to let our class come to the Museum. I liked the mummies and bones, dinasaurs and that whale. I never saw a real whale before and I couldn't beleave my eyes! I went thair before. I seen more this time thain last. Well I better get to work now."

A wise observation from a Chicago girl:

"The things you showed us were very interesting. When we saw the cavemen I thought that was so interesting. The first caveman was the most interesting one of all. It showed how we think they looked. Dinosaurs are another thing I thought was very interesting. I wish that you could have all the parts of the dinosaurs. If dinosaurs were still living some of the people would be dead. I wish we could have stayed there much longer."

Some sound advice from a young Winnetka, Illinois resident:

"Thank you for showing us those animals. They looked like real. The baby deers were very cute. Museums are very fun to go to, but you should be quiet."

And last, a personal note from a youngster in La Grange, Illinois:

"I had a very nice time with you Monday. I liked the things I saw. I hope you didn't get too tired, and got home in time to eat dinner. I would like to visit you again. Thank you again for taking us through the Museum."

THIS MONTH'S COVER

Stanley Field Hall, the vast and imposing central exhibition hall into which the Museum's two main entrances open, offers many camera angles of interest to photographers. The latest view of this hall, which extends the height of the building, appears on our cover to show the changed look since the addition of the skeleton of the giant dinosaur Gorgosaurus. The cover picture was made by the Museum's staff camera men, John Bayalis and Homer V. Holdren.

STAFF NOTES

Dr. Clifford C. Gregg, Director, was a speaker at the meeting on "Co-operative Education and the Impending Crisis" held May 23 and 24 at Dayton, Ohio, by the Thomas Alva Edison Foundation. Before he sails for Europe in June as a delegate to the World Council of YMCA's, Dr. Gregg will deliver the commencement address at the University of Houston (Texas) on June 4 and at Aurora (Illinois) College on June 17 .... **George I. Quimby,** Curator of North American Archaeology and Ethnology, was elected president of the Society for American Archaeology at its annual meeting held in conjunction with the Central States Anthropological Association at the University of Wisconsin, Madison, in May. Papers on scientific subjects were presented by **Dr. Donald Collier,** Curator of South American Archaeology and Ethnology, **Roland W. Force,** Curator of Oceanic Archaeology and Ethnology, and **Phillip H. Lewis,** Assistant Curator of Primitive Art. **Dr. John B. Rinaldo,** Assistant Curator of Archaeology, and **Allen S. Liss,** Assistant in Anthropology, attended the meetings. On May 17 Mr. Lewis spoke on "An Anthropological Point of View of Primitive Art" before an audience at the Art Institute of Chicago. Mr. Liss attended the meeting of the Illinois Archaeological Survey in Springfield .... **Dr. Karl P. Schmidt,** Curator Emeritus of Zoology, **Dr. Robert F. Inger,** Curator of Amphibians and Reptiles, **D. Dwight Davis,** Curator of Anatomy, **Loren P. Woods,** Curator of Fishes, and **A. Stanley Rand,** temporary assistant in Mammals, attended the recent meetings of the American Society of Ichthyologists and Herpetologists in New Orleans. Dr. Schmidt presented a paper at the meeting of the National Academy of Sciences in Washington, D.C., and under assignment from the American Institute of Biological Sciences he served as visiting lecturer at Sul Ross College, Alpine, Texas .... **Dr. G. Alan Solem,** Assistant Curator of Lower Invertebrates, has been elected an associate member of the Natural Science Foundation of Philadelphia, an organization devoted to research on Pacific mollusca.

BOOK REVIEW

BOY'S BOOK OF FROGS, TOADS, AND SALAMANDERS. By Percy A. Morris. 240 pages, 75 photographs. The Ronald Press Co., New York. $4.

After a very brief introductory chapter on the general biology of amphibians and one on collecting and preserving, the book discusses in sequence salamanders, toads, tree frogs, and what the author calls "true frogs" of the United States. Within chapters each species is treated separately and the life history, habitat, and habits are presented as far as known. Photographs of the animals and, in some cases, their habitats are sprinkled throughout the book.

Unfortunately this book has many defects, beginning with the title. In the first place only North American species are included, and far from all of those. Thus the interested young reader might not be able to learn anything about the little frog or toad he had captured on his vacation because the species was not included. Or, even worse, he might be led into a false identification. The language of the book is rather mature, so that any youngster able to read it would also be able to read several vastly superior books on the same subject now available in the Museum Book Shop.

A number of incorrect statements suggest that the author failed to use good general references. For example, the author says that the hellbender and mudpuppy are the largest American salamanders. Actually, the greater siren and the three-toed Amphiuma are larger. The photographs range in quality from mediocre to poor.

ROBERT F. INGER
Curator of Amphibians and Reptiles

TOOLS OF SURVEYORS AID SHALE STUDY

By EUGENE S. RICHARDSON, Jr.
CURATOR OF FOSSIL INVERTEBRATES

WE HAVE TOLD, in past issues of the BULLETIN, of some of the discoveries of Coal Age fossils in and near the Mecca Quarry (named for an Indiana town nearby) excavated by the Department of Geology. On this site Dr. Rainer Zangerl, Curator of Fossil Reptiles, and I have found more than 65,000 fossils and fossil fragments, whose position and orientation we have charted on a large number of scale drawings of the quarry. We have told, too, how we spent several weeks in the Mississippi River delta country exploring the *flotant* terrain in search of a modern counterpart of the living conditions of the animals of 240 million years ago that became the Mecca fossils. But that is not the end of the Mecca story.

For that matter, it will take several years of study to come to the end of the research opened up in that one small quarry of 20 square meters. There are many primitive vertebrate fossils of completely unknown types that must be assiduously prepared and studied and described. There are also many problems concerned with the geographic extent of the living conditions that gave rise to the black shales and the many well-preserved fossils that we have recovered. It is that group of problems that occupies us in the 1957 field season.

As explained in a BULLETIN article (November, 1956) Pennsylvanian living conditions at the quarry site were such as could only occur in a narrowly circumscribed area. It was not a broad open sea with uniform environment extending over hundreds of square miles; it was not a broad swamp covering several states; nor was it a shoreline hundreds or thousands of miles long with uniform environment for life all along the strand. Rather, these peculiar animals lived in a restricted basin of shallow water, probably cut off from the open sea by a series of bars or shallows, yet sufficiently open to it so that marine shellfish could get in. The surface of the water was probably covered with a thick mat of floating vegetation whose rapid decay provided the organic matter that gives the black shale its color.

CHECKING IN FIELD

Having proposed to ourselves this rough outline of the ancient local geography, we had to check it in the field. That meant examining nearby outcrops of the same rocks and studying the differences in lithology (rock composition) and fossils. We have done some of this in the recent years of studying the quarry problem and are continuing that part of the program this season. We attempted at first to follow the standard practice of correlating beds exposed in nearby places by comparing the elevations above sea level at which we find the outcrops. Because the Pennsylvanian (Coal Age) rocks appear to be very nearly level in most exposures, it is a handy assumption that they actually are level and that therefore, if a certain bed appears on the surface of the ground at 550 feet above sea level in one creek valley, it will also appear at 550 feet above sea level in the next valley, a half mile away. But actually this is not so, as detailed mapping soon shows.

NATURE PROVIDES GAUGE

Museum scientist studies a vertical-wall exposure of the rocks lying above the Mecca quarry shales. Only in such vertical exposures can the true thicknesses of these beds of rock be determined. This one is in the wall of a fire-clay pit of the Clay City Pipe Company near Montezuma, Indiana.

Since proper correlation of beds is fundamental to tracing the rocks formed at the same time, we have in several instances made detailed maps, using standard surveyors' instruments, as a guide in tracing the exposures. At the same time, these maps show us the sequences of rock types exposed in the several gullies and hillsides that we have mapped. Using the assumption that the beds are fairly flat-lying, at least over short distances, we were at first satisfied to determine the elevations of the successive beds seen in a given gully and then to arrive at the thickness of a bed by subtracting the elevation of its bottom from the elevation of its top. However, as we

(*Continued on page 4, column 1*)

SOUTHWEST EXPEDITION BREAKS NEW TRAILS

By PAUL S. MARTIN
CHIEF CURATOR OF ANTHROPOLOGY

MEMBERS of the 1957 Southwest Archaeological Expedition look forward to the present season with high hope and eagerness. Digging is to be done in an area that has been "surveyed" by archaeologists but in which little or no systematic excavation has ever been carried on.

The area to be worked lies in a triangle that is approximately bounded by Springerville, Show Low, and St. Johns, Arizona, and includes the headwaters of the Little Colorado River in east-central Arizona. The base camp is near the town of Vernon. Dr. John B. Rinaldo, Assistant Curator of Archaeology, will accompany me on the expedition, Roland Strassburger, of Winnetka, Illinois, is expedition photographer, and other personnel will join the expedition in the field.

SUMMARY OF PAST RESEARCH

Before explaining why this area was chosen for continuing our research a brief summary of what we accomplished in New Mexico during the fifteen seasons we worked there will place our present tasks and queries in clearer perspective.

We found that the Mogollon Indians had inhabited the Pine Lawn Reserve area in New Mexico continuously for about 3,800 years (2500 B.C. to A.D. 1300) or perhaps even longer. At first they depended more on wild plants for subsistence than on corn and beans, but later this situation was reversed. They lived in earliest times in caves or flimsy shelters, cooked in baskets, hunted with a throwing stick and spears, and used tools that were serviceable but rough. Later they built pit-houses and surface pueblos, made pottery and cooked in it, improved their techniques of basket making, weaving, and producing tools of bone and stone.

In short, we have traced the development of a civilization from an early primitive level to a more advanced one. Every phase of Mogollon life showed progress and improvement.

UNEXPLAINED EVACUATION

But, suddenly, at about A.D. 1300, these people abandoned a forested mountainous area, a region that today seems attractive to *us*, at least, and moved out. Why they moved on is unknown and what became of them is uncertain. But we know that some of our Pine Lawn Mogollon Indians moved

north and west into the country drained by the Little Colorado River in Arizona.

The area in Arizona in which we shall conduct research for the next several seasons was chosen because it was the one that was most likely to yield answers to some of our questions: (1) What happened to the Mogollon Indians of the Pine Lawn area after they moved to a different region? (2) Did these people make a successful adjustment in their new homeland? (3) Did they remain there or did they pass out of existence completely? (4) If they did not perish, what eventually became of them and can they be identified with any known contemporary group of Indians such as the Hopi or the Zuni Indians? (5) Were the Mogollon Indians the first settlers of the area drained by the Little Colorado River or, if not, who preceded them and what is their history?

These are but a few of the questions that are going through our minds as we start our westward trek. If we obtain even a partial answer to any one of them, we shall be fortunate indeed; for archaeological problems are easy to formulate but sometimes difficult or impossible to solve. I think it is easy to see that these problems give impetus and zest to the expedition. Further, we shall be working in a district that is, in an archaeological sense, virtually untouched.

SHALE STUDY—

(*Continued from page 3*)

accumulated more and more information from more and more gullies, we found notable discrepancies in both elevations and thicknesses derived in this way. Further, we found the same discrepancies in studying old reports of this area, some published soon after the Civil War. We wanted to be able to use many of these reports because they were based on exposures that are now, in many cases, covered by building, by soil-slides, or by changes in stream courses. Yet, as we have studied the rocks and the old reports, we have with regret had to discard much information that looked at first as though it would be useful, and we have come to realize that elevations of beds and also thicknesses have only a local significance.

This was well illustrated for us in April of this year, when, in surveying a small creek valley near Mecca, we found the quarry shales exposed at three places on the sides of the valley and at a fourth in the bed of the stream. The elevations at these four points, though the outcrops lay within a radius of a few hundred feet, differed by as much as 15 feet. Obviously, then, we could not use any one of those elevations in computing the thickness of beds lying between the quarry shales and another bed, the "Staunton B," exposed in the lower course of the stream half a mile away. Obviously, also, we could not rely on any other thicknesses derived in that way by the other geologists who have worked in the area.

However, all was not negative, for we gained some positive results as well. Why, we asked ourselves, do the thicknesses and elevations vary so much? Elevations may vary because of a bed having been wrinkled by compressional earth forces. We know that there has been some activity of this sort in Indiana and Illinois. Indeed, early in May, in a creek bed near West Union, Indiana, we found a small pinched fold in the Pennsylvanian rocks showing rather intense local compression of the earth's crust. But the structural movement of the rocks thus indicated is a later feature than the rocks themselves; unless structural deformation is very severe it doesn't affect the thickness of

WADING FOR SCIENCE

Dr. Rainer Zangerl, Curator of Fossil Reptiles, adjusting the plane table used in surveying an Indiana creek valley. Because of dense vegetation, lines of sight can be found often by working right in the water of streams.

beds of rock. Is it possible that there were similar differences in elevation during the Coal Age itself? And, if so, what would cause such a thing?

POSSIBLE EXPLANATIONS

The answer seems to be that there probably were local differences in elevation while the rocks were being deposited. This is a necessary consequence of some of the rock types found in the sections. For example, in two nearby creeks we find the interval between "Staunton B" and the quarry shales differing by as much as ten feet. Now, this may be merely an apparent difference due to the difficulty inherent in measuring thicknesses by subtracting elevations. But the rocks occupying this interval supply an alternative explanation that seems very attractive. The thinner interval is occupied entirely by soft shales; the thicker interval is in part occupied by sandstone. Now, shale is formed by the squeezing and hardening of a clay mud, and sandstone is formed from a wet sand. If you have ever made mud pies you will recognize that mud holds a great deal of water; when the mud dries out it shrinks and cracks—it occupies a much smaller space. Sand castles, on the other hand, don't shrink, though they may fall apart because there is nothing to stick the grains of sand together when they dry out.

Now, if the sea bottom on top of the Staunton B had been covered with a layer of plain mud in one place and a combination of mud layers and sand layers a half mile away, forming a level bottom, the mud in the first spot would lose more volume in turning to rock than the mud and sand in the second spot, with the result that the coal deposited on top of this surface would develop a sag. Then, when the coal was submerged again, there would be a relatively deep pool in one place and a shallow one in another. Conditions such as we have postulated for the deposition of the quarry shale would be met, the animals living in the deep pool would be partially cut off from the open sea, and oceanic waves would not disturb the isolated pool.

It is still necessary for us to put this hypothesis to further tests in the field before we are entirely satisfied with it. It is just one of the facets of the problem of the black-shale fossils, but one whose place in the total picture is as important as any.

AWARD FOR BOOKMAKING WON BY MUSEUM

At the Eighth Annual Exhibition of Chicago and Midwestern Bookmaking held by the Chicago Book Clinic, Chicago Natural History Museum was presented a Certificate of Award in recognition of its entry *The King's Day*, by Mrs. Webster Plass of New York and London (BULLETIN, October 1956 and November 1956). The award, recognizing the high standards of design, printing, binding, publishing intent, and reader appeal, is particularly gratifying in view of the fact that the competition included entries from commercial publishers and carefully planned advertising brochures from many outstanding commercial organizations. The design, planning, and supervision of the publication were accomplished by Helen A. MacMinn, Associate Editor of Miscellaneous Publications on the staff of this Museum, who received a similar award from the Chicago Book Clinic in recognition of her contribution to the excellence of the publication. All phases of the work, including the photography, were done by the Museum organization with the exception of the photoengraving by Jahn and Ollier Engraving Company. The booklet was prepared for presentation to all guests of the Museum on Members' Night in October of 1956, and since that time has been on sale with other popular publications of the Museum.—C.C.G.

OBSERVATIONS ON LAKE MICHIGAN FISHES AT CHICAGO

By LOREN P. WOODS
CURATOR OF FISHES

EXTENSIVE REACHES of the shores along the southern part of Lake Michigan consist of sandy beaches. Here the waves constantly shift and sort the sand at shallow depths—depositing it, transporting it a little distance, and redepositing it. The sand is ground to incredible fineness, and because it is mixed with silt it resembles

ROCK BASS

An inhabitant primarily of rocky areas in lakes and streams with clear cool water, this fish is a special favorite of young anglers.

mud. It does not act like mud, however (that is, it does not pack firmly), and so it is possible for the deep-reaching waves of storms to stir the bottom in water at least 25 feet deep. This is one of the reasons why the cribs where Chicago's drinking water is gathered are located two to five miles offshore in depths of 32 to 37 feet. The sand may remain close to the bottom, but the turbulence of the waves draws the silt up where it remains in suspension, making the water cloudy for several days after storms and waves subside.

Such a habitat of shifting sand is an extremely difficult place to live. The smothering effect of sand plus poor light resulting from the frequently turbid waters are very unfavorable conditions for both plants and animals and few can maintain themselves here. So, generally speaking, the vast areas of sandy beaches extending considerable distances offshore are barren "deserts." A careful search has revealed *nothing* large enough to be seen living on beaches in depths of less than 5 feet. Occasionally schools of small fishes (perch) may visit during periods of calm, and occasional snails or plants such as *Elodea* or *Myriophyllum* are drifted in, but there exists no permanent flora or fauna.

The majority of kinds of plants and animals live a pelagic existence in the upper open lake-waters well off the bottom, in the quieter waters of the lagoons, or on the rocky reefs where they are raised above the constantly shifting sands. There are several natural rocky outcrops along the shores of the Chicago area. Bottom-living plants and animals are the most abundant where the rocky substrate permits attachment of algae and the holdfast organs of animals. Snails (*Goniobasis*) may live here after being washed in from deeper waters but they are probably not permanent residents. Lake trout formerly spawned on rocky reefs off Lincoln Park.

MAN-MADE REEFS

Jetties, breakwaters, and sea-walls with their extensive protective foundations of large rocks have created a vast series of artificial reefs along the city waterfront and greatly increased the living space for many reef-dwelling forms, of which the most conspicuous are crayfish and log perch.

Almost no investigations have been made of the biology of either the natural or artificial reefs here, probably because they are rather inaccessible, relatively barren, and not very interesting.

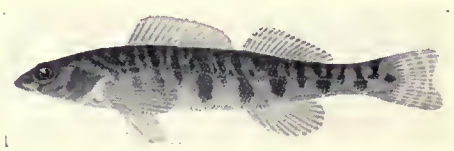
One day last summer when I was swimming off the sea-wall near the Planetarium the water was unusually calm and clear. Although it was late afternoon, visibility was good to 15 feet. By diving with face mask and swim fins I made observations of the pilings and rocks on the bottom. On the surface a school of whirligig beetles swam aimlessly, as they might on any quiet pond, scattering with every nearby disturbance. The wooden pilings were covered with short golden-green threads of algae that moved with the slight motion of the water. Among the pilings and algae were hundreds of small yearling perch, 2 or 3 inches long, too small to be interested in the shiners baiting the hooks of the fishermen lining the promontory. Although none of these perch were seen feeding, they probably ate occasional sidekickers (amphipods) and other small invertebrates that live in the tangle of filamentous algae.

Several medium-sized rock bass, probably 6 or 7 inches long, were hiding in the spaces between the pilings. Around them was an area clear of small perch. Neither perch nor rock bass appeared to be frightened by me; but if they were approached, they quickly swam just out of reach and returned as soon as I passed.

CRAYFISH ON GUARD

The bottom here close to the wall is about 12 feet below the surface and consists mostly of angular rocks 1 to 2 feet in diameter. The exposed surfaces of the rocks were clean, probably kept this way by the strong currents of waves deflected by the wall. Between the angular rocks were crevices of various widths and lengths. In many were wedged bottles, bottle caps, and beer cans, and among them, living here in great abundance, were large crayfish. They did not retreat as did the other animals, but when my hand passed above one it would rear up in its most threatening manner with its pincers spread, ready to do battle.

On the smooth rock surfaces were a few large (3 to 5 inches) log perch. These beautifully shaped, zebra-patterned fish skipped rapidly from one to another rocky prominence with a smooth darting motion. The light yellow of their backs and sides matched the color of the rocks, and their narrow black bands actually made them inconspicuous until they settled on the rocks. Log perch are members of the subfamily of darters in the perch family. These darters are small (1 to 3 inches over-all length with the exception of the log perch). They have a fusiform body and enlarged pectoral fins, but they do not have a swim bladder and are thus heavier than water. As soon as they stop swimming, they quickly sink to the bottom where they brace themselves by their pectoral fins. Most kinds of darters are stream fishes living in the swift waters in the rapids of streams of our area. Log perch, although adapted to large swift streams, are also at home in the strong currents that may move along the face of a promontory sea-wall. They are quite



LOG PERCH

One of the most common of the darters, and the largest, attaining a length of 8 inches, this fish has the appearance of an elongated perch.

active during the winter and not torpid as many fishes are. Their food is small crustaceans and insect larvae.

Diving in other places along the lake front or at other times of the year would certainly add to these sketchy observations, but so far I have not had the opportunity to repeat the experience under such favorable conditions.

Museum Auditor Elected

Miss Marion K. Hoffmann was elected Auditor of the Museum at a meeting of the Board of Trustees on May 22. Miss Hoffmann joined the staff as Bookkeeper in 1952, and since early 1956 has been Acting Auditor.

It's So Simple in Philippines

The marriage ceremony is conducted with little fuss or bother by the Batak tribe of the Philippines. The groom makes a small gift and presents it to the parents of his intended bride. Then the betrothed couple sit down with a married couple and eat from the same dish, smoke the same cigar, and thus become Mr. and Mrs.—it's as simple as that. Other facts about the Philippine Islanders are illustrated in Hall A (Peoples of Melanesia and the Philippines).

DATING THE PAST—UPPER GREAT LAKES AREA

By GEORGE I. QUIMBY
CURATOR OF NORTH AMERICAN ARCHAEOLOGY AND ETHNOLOGY

IN ATTEMPTING to reconstruct the prehistoric Indian mode of life and the changing environments of the past 13,000 years in the Upper Great Lakes region a chronological framework in which to place events in their proper sequence is necessary. Fortunately such a chronological framework can be constructed from the data of Pleistocene geology, pollen analysis, and radiocarbon dating.

For instance, an excellent geological clock of relative time is provided by the stratigraphic sequence of phenomena related to the advance and retreat of the continental glaciers. Such phenomena as moraines and other surface features produced by glaciation, fossil beaches, outlets of glacial lakes ponded by the ice front at various positions, old lake-beds, and old drainage-systems, when stratigraphically ordered, produce a relative chronology of geological events that can be correlated with archaeological events.

Another method of dating the past is by the analysis of plant pollen that falls to the earth or into lakes and ponds and is preserved in layers of soil or sediment. Quantitative analysis of the fossil pollen by layer in peat or soil deposits enables the palynologist to reconstruct the vegetation that was growing in the area at the time the pollen was deposited in each layer. A succession of such layers with fossil pollen will show the succession of vegetation over a long period of time. Thus the palynologist can provide a relative chronology of flora and, by inference, of climate for the region.

SEQUENCE BY FLORA

The generalized sequence of flora in the Upper Great Lakes during the past twelve or thirteen thousand years is first a forest composed mainly of spruce and fir; next a forest composed principally of pine; then a forest dominated by oak and pine; then an oak-hickory forest coeval with the maximum expansion of grasslands; and finally a forest in which oak and pine are dominant.

The climate inferred from these stages of flora is as follows: first a period much colder than the present, next a period of increasing warmth, then a warm period most of which was much hotter than the present, and finally a cooler period much like the present. This floristic and climatic chronology can be correlated with the chronology of geological events and also with cultural events discovered by means of archaeological techniques.

RADIOCARBON DATING

Still another way of dating the past is provided by the radiocarbon-dating method developed by Dr. Willard F. Libby. This method determines the approximate age of organic substances by measuring with special apparatus the amount of Carbon 14 they contain.

Carbon 14, a radioactive heavy form of carbon, is created constantly in the earth's upper atmosphere. It subsequently becomes part of the earth's atmosphere and enters all living things. All living matter contains a constant proportion of Carbon 14—thus, when a plant or animal dies the amount of Carbon 14 present is known. And since Carbon 14 then disintegrates at a constant rate, the amount of Carbon 14 remaining at any given time is proportional to the time elapsed since death.

By means of this technique it is possible to measure the age of organic remains and the things with which they are associated. Thus the age of a tree buried under a glacial moraine can be determined and the glacial stage represented by the moraine can be dated approximately. Similarly the age of a piece of driftwood enclosed in a fossil beach can date the beach, the age of a mastodon tusk can date the death of the mastodon, and a piece of charcoal from a prehistoric Indian camp-fire can provide the approximate date of an Indian village. It should be noted, however, that for reasons inherent in the radiocarbon method, all radiocarbon dates should be considered approximations of absolute dates.

13,000-YEAR TIME TABLE

By combining radiocarbon dates with the geological and pollen sequences it is possible to construct a reasonably adequate chronological framework for the past 13,000 years in the Upper Great Lakes region.

The following brief outline of events in the Upper Great Lakes region leans heavily upon the work of Dr. F. T. Thwaites, Dr. J. H. Bretz, Dr. G. M. Stanley, Dr. J. L. Hough, Dr. J. H. Zumberge, Dr. W. N. Melhorn, and Dr. J. A. Elson, geologists specializing in glacial research.

The sequence of geological events in the Lake Michigan basin rests upon well-established field evidence and a reasonable supply of radiocarbon dates. The sequence of geological events in the Lake Huron basin also rests on good field evidence but lacks an adequate supply of radiocarbon dates. The major difficulty in establishing a detailed geochronology useful for archaeological pur-

Calendar of Geological Events and Radiocarbon Dates for the Upper Great Lakes Region

Estimates from radiocarbon dates	Advances and Retreats of Glacial Ice	Lake Stages and Elevations of Water-planes above Sea Level	Forest Succession
11,000 B.C.	*Late Cary.* Ice retreats from Lake Border moraines to Port Huron moraine and northward	*Glenwood Stage of Lake Chicago.* 640 feet above sea level (corresponding stage in Huron basin)	Spruce-fir
10,000 B.C.	*Two Creeks Interstadial.* Ice retreats to position north of Mackinac Straits	*Bowmanville Low Water Stage.* Water planes at very low level	Spruce-fir
9000 B.C.	*Valders Glacial Advance.* Ice advances to maximum position of Valders red drift	*Calumet Stage of Lake Chicago.* 620 feet above sea level (corresponding stage in Huron basin)	Spruce-fir
8500 B.C.	*Valders Retreat.* Glacial ice retreats northward	*Toleston Stage.* Glacial lakes probably at 580 feet above sea level	Spruce-fir
8000 B.C.	*Valders Retreat.* Glacial ice retreats northward	*Glacial Lake Algonquin Stage.* 605 feet above sea level	Spruce-fir
7000 B.C.	*Valders Retreat.* Ice retreats in Ontario, Canada	*Post-Algonquin Stages.* Falling water-levels: Wyebridge—515 feet, Penetang—475 feet, Cedar Point—455 feet, Payette—415 feet, probable lower stages	Spruce-pine
6000 B.C.	*Terminal Glacial.* Ice retreats from northern Ontario by middle of period	*Lake Chippewa–Stanley Stage.* 180 to 230 feet above sea level	Pine
3000 B.C.	*Post-Glacial*	*Lake Nipissing Stage.* 605 feet above sea level	Oak
1000 B.C.	*Post-Glacial*	*Lake Algoma Stage.* 596 feet above sea level	Oak-hickory
500 B.C.			

poses is the lack of proved correlations between events in these two lake basins before the Lake Algonquin stage. This is a critical problem that has not yet been solved.

There are at least three major theories of the correlation of pre-Algonquin stage geological events in the Lake Michigan and Lake Huron basins. Until new field evidence and/or more radiocarbon dates become available, all these correlations remain primarily different interpretations of essentially the same data. The correlation used in this article is based upon a theory by Dr. Jack L. Hough, geologist at the University of Illinois, which was published in 1956.

The somewhat complicated outline of stratified geological events and radiocarbon dates presented here provides the basis for a kind of broad calendar to which can be related the prehistoric Indian cultures and their changing environments in the Upper Great Lakes region.

Undoubtedly this calendar will be modified and refined by the discovery of new data. But even in its tentative form it is a useful tool for the prehistorian and paleogeographer interested in the Upper Great Lakes.

RARE FOSSIL SHARK FOUND IN INDIANA

Through the generosity of Dr. Maurice L. Richardson, of Lansing, Michigan, the Museum is on the trail of a large fossil shark that is more than 15 feet long. The tail of the big fish has already been recovered for the Museum. The animal lived in the Pennsylvanian period, about 240 million years ago.

For many years Dr. Richardson has been making contributions to the Museum, and the accumulation of these has resulted in the establishment of the Maurice L. Richardson Paleontological Fund. This fund has enabled the financing of a field trip to a quarry near Bloomingdale, Indiana, to excavate the skeleton of the big shark, which was discovered buried in the rock. Assigned to this task are Dr. Rainer Zangerl, Curator of Fossil Reptiles, Dr. Eugene S. Richardson, Jr., Curator of Fossil Invertebrates, Orville L. Gilpin, Chief Preparator of Fossils, and Bruce Erickson, Preparator.

Daily Guide-Lectures

Free guide-lecture tours are offered daily except Sundays under the title "Highlights of the Exhibits." These tours are designed to give a general idea of the entire Museum and its scope of activities. They begin at 2 P.M. on Monday through Friday and at 2:30 P.M. on Saturday.

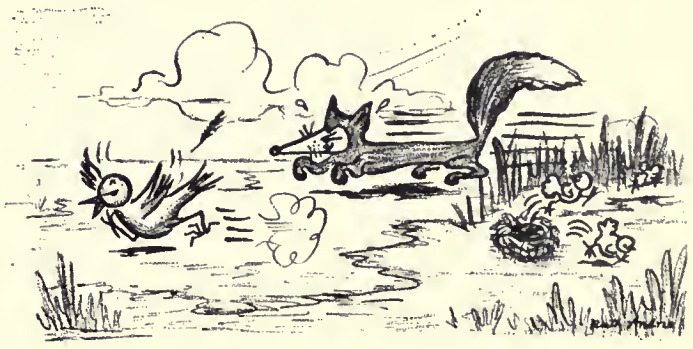
Special tours on subjects within the range of the Museum exhibits are available Mondays through Fridays for parties of ten or more persons by advance request.

SOME BIRDS ARE GOOD PARENTS; SOME AREN'T!

By AUSTIN L. RAND
CHIEF CURATOR OF ZOOLOGY

THE MUSEUM ZOOLOGIST does not restrict his studies to data he can get from preserved specimens but he uses information on the habits of the animals too. If he is studying evolution, he may find that conclusions from the structure and habits often dovetail nicely. But just as some structures defy explanation from a "useful" point of view, so do some habits.

The plumage of a loon is a splendid waterproof coat for this swimming and diving bird; yet anhingas and cormorants swim and dive though their plumage is not waterproof and they have to come ashore periodically to dry out. The partly-webbed feet of phalaropes are useful for swimming; yet man-o'-war birds with partly-webbed feet rarely light on the water. The king bird that protects its nest by driving away crows and hawks may attack such inoffensive birds as upland plovers and green herons even after the nesting season is past. Evidently a bird can be generally fitted to its environment even though in certain traits of behavior and details of structure it may be maladjusted. To point this up I shall outline several aspects of parental care.



Cartoon by Ruth Andris

The broken-wing ruse of the killdeer—flopping ahead of a man and leading him away from her nest or young—seems a wonderful bit of behavior to help the young escape enemies, and the survival of the offspring is a fundamental step in enabling the species to continue. But before we marvel at how well nature provides for her children, let us look further. First, the noisy solicitude of a bird about the nest or young may actually guide an enemy to it, like the "hot" or "cold" of a childhood game. Also let us look at the other end of the spectrum where the parents may deliberately cause the death of their young or the young of their group.

HIGH JUVENILE MORTALITY

In a ring-billed gull colony in Upper Michigan numbering 850 pairs, about half the young birds were killed by adult birds striking blows with their bills. The social structure of the colony and the characteristics of the young contributed to this heavy mortality. The nests are closely spaced, and each pair defends the territory around its nest against the others. The young, downy when hatched, stay in the nest at first, while the adult flies away for food. But soon the young bird is walking about, and when it intrudes into the territory of other gulls, it is attacked, and may be killed, according to Dr. John Emlen of the University of Wisconsin.

Young grebes that can swim and dive immediately after hatching are commonly carried on the backs of their parents. Sometimes the young remain snugly under the parents' wings during the dives of the old birds. This is standard practice when the young are small. But as the young grow larger and still try to ride on the parents' backs, the parents rebel. No longer will they tolerate the bulky youngsters climbing on them. The young are repelled by the pecking of the parents and this results in the death of some of the young, according to J. Munro, wildlife expert of British Columbia.

EATEN BY PARENTS

A still more strange fate overtakes some young skuas of the Antarctic. The skua hatches her two eggs, and the young develop like young gulls, beginning to wander as they grow up. It has been reported that if the parent returns to her nest and broods only one of her chicks, the other, moving about nearby, may be killed and eaten by her. Dr. R. C. Murphy, an authority on oceanic birds, explains this habit of the skua in terms of a confusion in psychological drives. Once one of the young is brooded, the parent's brooding drive is satisfied, and the other chick moving about in front of the adult rouses its feeding drive, never far below the surface in these rapacious relatives of the gulls.

In these birds we can see a range in parental care, from ostentatious anxiety, which may defeat its purpose and indicate the location of the nest or young to an enemy, to an occasional animosity, whose expression may cause the death of the young. Yet each of the species survives whether because of or in spite of this phase of the behavior of parents. One lesson is clear: We must not assume that a special bit of bird behavior—and the same applies to a special structure—is beneficial. Perhaps the species survives in spite of it.

GEM SHOW TO OPEN

The Seventh Annual Amateur Handcrafted Gem and Jewelry Competitive Exhibition, under the auspices of the Chicago Lapidary Club, will be held at the Museum from June 1 through June 30. The show will display in Stanley Field Hall the award-winning work of "rockhounds" of Chicago and suburbs within a 50-mile radius.

Scores of amateur lapidary and jewelry craftsmen, including both members and non-members of the Chicago Lapidary Club, participated in the contest. Trophies and ribbons were awarded to approximately 60 of the entries, representing the work of more than 50 contestants. All who enter the competition are required to do their own cutting and polishing of gems and slabs of gem material, and those who make jewelry must design and fashion the gold and silver mountings they use.

The exhibits are divided into two basic classifications—the work of novices and that of advanced craftsmen. Both classifications have ten specialized-craft divisions: cabochon-cut gems, faceted gems, individual jewelry pieces, jewelry sets, gem collections, polished slabs, enameled jewelry, etc.

The exhibit that was awarded the Dalzell Trophy for the best in the show is a group of six faceted synthetic gems of different shapes and sizes, the work of Albert L. Malik, of Chicago, who also won the Presidents' Trophy for outstanding lapidary work in the advanced division with his entry of a faceted synthetic golden sapphire. The Councilmen's Trophy for outstanding jewelry in the advanced division was awarded to J. Lester Cunningham, of Chicago, for his entry of a jade pendant set in a yellow-gold dragon design. The Juergens Gold Medal for the outstanding lapidary achievement by a novice went to Earl Christensen, of Chicago, for a faceted amethyst, brilliant-cut. The Milhening Gold Medal Award for the outstanding achievement in jewelry creation by a novice was given to Robert E. Brown, of Chicago, whose exhibit is a bolo tie-pull in mosaic, with turquoise and coral center.

SCIENTISTS OF TOMORROW HAVE THEIR DAY AT MUSEUM

Some 250 junior scientists of the Chicago area displayed their achievements in research in 150 exhibits filling all available spaces in vast Stanley Field Hall on May 18. Adult visitors to the Museum that day were startled by the scope of knowledge the exhibitors displayed and elated to find that here were notable evidences that the young generation is composed predominately of healthy vigorous minds, a fact that bodes well for the nation's future. Each young exhibitor was prepared with a lecture to accompany his scientific demonstration.

The event was the annual Chicago Area Science Fair under the auspices of the Chicago Teachers Science Association. Even the teachers present who had supervised the classroom work of these students admitted their own astonishment at many of the accomplishments on display. The young folks and their exhibits came from public, private, and parochial schools of Chicago and surrounding communities within a 35-mile radius of the city. Each exhibit represented a particular school where it had been selected as the outstanding one from among all competing productions. Each grade-level from 6th elementary through the four high-school grades was represented. A committee of teachers awarded prizes after a careful appraisal of all exhibits brought to the Museum.

In the picture at left above, Sidney Stahl, sophomore, and Susan Grohs, freshman, demonstrate the operations of their weather forecasting station, also created by Helen Harton and Leslie Hatrich, freshmen, and James Andrew, sophomore (all of South Shore High School). In picture at right, Virginia Jepson (seated), freshman at Calumet High School, demonstrates to two young visitors the apparatus and methods used in purifying a community's water supply. Among the many other difficult subjects illustrated by the children's exhibits were: The Atom and Its Uses, Production and Use of Antibiotics, The Prehistoric World, The Vacuum Tube, Conservation of Wild Ducks, Blood Circulation of Man, A Model Earth Satellite, and Model of a Nuclear Reactor.

GIFTS TO THE MUSEUM

Following is a list of the principal gifts received during the past month:

Department of Anthropology:

From: Estate of Pauline P. Aren, presented by Mrs. Anna Fridstein, Chicago—hanging appliqued with gold thread, China; Sidney Teller, Chicago—ethnological material

Department of Botany:

From: Dr. Leandro Aristeguieta, Caracas, Venezuela—*Insertia Haenkeana;* A. J. Breitung, Pasadena, Calif.—*Scirpus pumilus* var. *rollandii*, Canada; Georgia Experiment Station, Experiment—2 samples of seed of *Sorghum vulgare* var. *saccharatum;* Carl S. Miner, Chicago—*Collybia acervata* Fr.; Dr. Mariano Pacheco H., Guatemala City—9 orchids

Department of Geology:

From: K. Shimizu, Chicago—collection of fossil mammals, reptiles, dinosaur gizzard-stones, rocks and minerals, Wyoming

Department of Zoology:

From: Harry Hoogstraal, Cairo, Egypt—snake; Dr. N. L. H. Krauss, Honolulu—12 beetles, South Africa; John T. Moyer, Japan—31 birds; Museum and Art Gallery, Durban, Natal, South Africa—2 birdskins; R. B. Selander, Urbana, Ill.—pair of meloid beetles, Utah; Dr. Henry F. Strohecker, Coral Gables, Florida—19 Endomychid beetles, Africa and Madagascar; N. L. H. Krauss, Honolulu—4 frogs, 3 lizards, 3 millepedes, collection of land isopods, Africa; John G. Shedd Aquarium, Chicago—a fish specimen

NEW MEMBERS

(April 16 to May 15)

Associate Members

Joseph B. Ames, Dr. Pauline M. Cooke, Arthur C. Harrison, Frank H. Ingram, Henry P. Isham, Jr., Hjalmar W. Johnson, L. W. Porter, Melville N. Rothschild, Jr., Paul Weir

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Bulletin
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July 1957

"PEASANTS AND PRINCES"
Special Exhibit of Portraits
July 1 — September 2

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Members are requested to inform the Museum promptly of changes of address.

NEW PHILIPPINE BIRDS

BY AUSTIN L. RAND

CHIEF CURATOR OF ZOOLOGY

HAVING JUST NAMED four new Philippine birds, a brief survey seems timely. To know the kinds of animals there are and where they live is an important part, and perhaps the basic one, of our job in the Museum's Department of Zoology.

A museum is the only place where this kind of work, inventorying the kinds of animals, can have continuity. Only in museums are specimens filed, as are books in a library, for future reference and further interpretation. The named specimens housed there, and reported on, serve as standards against which new material can be compared. Such comparisons insure that when students in whatever field use the name of an animal they can be sure they are all talking about the same animal.

The thrill of adding something new to our knowledge is one of the highlights of discovering and naming a new species of bird. It means you have added one to the 9,000 or so kinds of birds that are known. It's comparable to the work of the explorer who puts a mountain or a river on the map. You know that as long as birds are studied the species you added will be on the list and that its range, make-up, and habits will have to be taken into account when any generalization is made about birds. It's a piece of work, an accomplishment, that is as permanent as anything one can do in this world. Chicago Natural History Museum's Philippine collections have yielded two new birds of species rank in addition to 16 new birds of subspecies rank. In 1952 Dr. D. S. Rabor, Museum Field Associate, and I named a babbling thrush from Negros Island and in 1951 Dr. Charles Vaurie described a tiny brown flycatcher from our collection when he was monographing this puzzling group.

DISTINCTIONS OFTEN DIFFICULT

More often than not, in the world of biology, things are not clear-cut. Psychologists argue about responses and drives; anatomists debate about whether a structure represents one or two muscles and about its homology; and taxonomists consider the classification of animals, as to which of the fourteen to thirty-four major groups of animals called phyla should be recognized and whether an isolated population is a species or subspecies.

The Philippines with its more than 7,000 islands and islets is a wonderful place to find series of isolated populations whose status as species or subspecies can be argued. In each series some populations may be conspicuously different, with contrasting characters such as a white vs. a black rump, red vs. orange neck, streaked vs. barred breast, white vs. dark outer tail feathers. Though these are local variations on a common theme, the differences between subspecific groups are often more obvious than are the external characters that separate species. Being island populations the subspecies are separated spatially and so we will never know if they would integrate if they met, the final criterion of a subspecies. Some workers would consider the little red-headed owl I described as a subspecies from Negros as a species; I consider the long-billed tree creeper recently described from Luzon as a species to be really a subspecies. The red-headed flowerpecker that I have just described as a subspecies from Western Mindanaeo is intermediate between what earlier seemed two species; so I put them all in one. In many cases there is no objective test. The best we can do is to accept the consensus of the majority of informed workers in the field.

On the other hand we can sometimes demonstrate that two forms are species. When Dr. Rabor and I described a new leaf warbler and reviewed its relatives we found that a gray-throated and a yellow-throated form that had been considered subspecies actually lived in the same area without integrating, the final test for species. In reviewing the large brown fruit pigeons we found the same thing; two alleged "subspecies" living together, proving they were two species.

THIS MONTH'S COVER

A portrait of a Shan tribesman of Chieng Mai in northern Thailand adorns our cover. This drawing is one of 45 by Elisabeth Telling that form a special exhibit, "Peasants and Princes: Portraits of Human Types in Indonesia and Central America." The exhibit will be on view in Stanley Field Hall from July 1 through Labor Day (see story on page 7).

Most of the new kinds of birds being described nowadays are plainly subspecies, paler or darker or brighter or larger or longer-billed than their relatives. As long as new populations are being discovered and range extensions made, some of these populations can be expected to be conspicuously different, like the three new races of the plain-headed tree creeper I described and the one described by Dr. F. Salomonsen in Copenhagen that extended its range to Luzon, Negros, and Zamboanga. Other subspecies are found when adequate series are available from within the known range of the species, as when I described two new races of the brown thicket flycatcher and one of the yellow-bellied thick head.

A FERTILE FIELD

Bird work in the Philippines is still in the exploration stage, as the recent discoveries indicate. Since 1946 five new birds have been described as species: the babbling thrush, the brown pigmy flycatcher, and the long-billed creeper mentioned above, and also a green fruit pigeon and a red-headed flowerpecker. Of new subspecies there must be two score. In addition to the work done by Dr. Rabor and that in Chicago, scientists in various parts of the world have described them. Especially active have been Dr. Salomonsen in Denmark, Dr. S. D. Ripley at Yale, Dr. Vaurie and Tom Gilliard in New York, H. Deignan in Washington, and Dr. C. Manuel in Manila. Chicago Natural History Museum has types of 17 of the new forms. The many scientists working in different places well illustrate the international aspect of our work, striving toward a common goal—in this case an inventory of the birds of the Philippines.

In 1946 we had only a few scattered specimens of Philippine birds, obtained by exchange. Then we had a full-scale expedition—Harry Hoogstraal, Museum Field Associate, made our basic collections from the main islands: Luzon in the north, Mindanao in the south, and Palawan that lies toward Borneo to the west. Since then we have been fortunate in having a working

(Continued on page 6, column 3)

SOME GOURMET RECIPES FROM EXPLORERS' COOK BOOKS

By JANE ROCKWELL
ASSOCIATE EDITOR

AT TIMES we all feel a little bored with the food that daily confronts us. We yearn for new foods, prepared in new ways. The increasing interest of Americans in exotic foods is strikingly apparent in the constantly expanding numbers of foreign restaurants in our cities, and even in our small towns and villages, inviting the venturesome to explore new gastronomic

Cartoon by Marion Pahl

delights. The gourmet is no longer shocked by an overwhelming prevalence of quick-lunch and greasy-spoon establishments.

The following recipes and food suggestions were gathered mainly from Museum staff members who have encountered them in their expeditionary travels to all parts of the world. Some of these culinary experiences have proved delightful; others are recalled by the consumers with a wince or a shudder. The reader can judge for himself which is which. In any case, all of the persons who sampled these foods survived to describe them.

A delicacy recently imported from Mexico and gaining some popularity in certain parts of this country is fried grasshoppers. Fried grasshopper fans also might like to sample the flavor of fried umbrella ants, a favorite snack in South America, or they could omit a step in its preparation and emulate the Iroquois Indians of northern New York and eat them raw. Fried worms are considered a delicate appetizer in Mexico; in fact, worms are utilized in various gastronomical ways. They appear whole or in powdered form in bottles of mescal, a distilled liquor made from the agave plant, and they are used as a flavoring agent for soups and stews. In Mexico, a staff member tells us, grasshoppers are often fried to a crisp in oil and chili pepper and are deliciously nut-like in flavor.

Now that some appetizers have been suggested, a second course might be recommended such as Shark's Fin Soup, eaten in China. For a serving for four, the ingredients are:

½ lb. skinless shark fins
3 rice bowls of chicken soup
½ T salt
2 ounces cooked ham

Warm the chicken soup, then add salt. Soak the shark fins in warm water for 10 minutes to soften. Then add the fins to the soup and cook 10 minutes. Sprinkle minced ham on top of the brew and serve.

SEAL AND WALRUS SOUP

If you're of an adventurous nature, an alternate second course might be Seal and Walrus Soup. The preparation of this Eskimo favorite is extremely simple. Merely boil water, blood, and blubber together with chunks of walrus and seal meat—and serve?

And now, on to the main course. Here are several suggestions. From South America there's iguana (a reptile which can be roasted, fried, or boiled), sautéd crocodile tail, roasted armadillo, or roasted paca (the latter a tender rodent considered by a staff member to be one of the tastiest of meats) and, from China, sashimi, which is raw tuna dipped in a mixture of soy sauce, mustard powder, and lime juice. Before sampling the latter a curator advises gallons of water near at hand.

A REAL 'PRODUCTION NUMBER'

If you're one who believes in elaborate preparation of your main course you might follow the example of the inhabitants of New Ireland in the South Pacific when preparing mumu, or baked pig. Mumu is eaten only at feast time and often it is served to as many as a thousand persons. For a very small feast, one wild pig is caught, suffocated, and cleaned. After the legs are removed at the shoulder joint, the rest of the animal is washed and then singed.

An outdoor oven is built with tiers of rocks. While the cooks are waiting for the rocks to heat to the proper grilling temperature, the time is passed by toasting some of the organs and limbs as appetizers and as a reward to the hard-working fire-builders. When the rocks are very hot they are wrapped in banana leaves and placed inside the pig through a flap provided for that purpose. Then the entire pig is wrapped in banana and other leaves and bound with vines. Sweet potatoes and taro (a starchy root) also are wrapped in leaves and placed around the pig on hot rocks and covered with more layers of rocks and leaves. Beach sand is then added so that no steam can escape. After that, all is covered with burlap sacking and one can ignore the five-foot-high oven for several hours.

The process begins at sunup, and when the sun begins to wane, dinner is ready. The cooks need not worry about heat regulation or electric timers. An anthropology staff member who has attended many such feasts assures us that the pig emerges very well done but very juicy and tender. Huge portions of the meat along with sweet potatoes, taro, and bananas are served on banana leaves to the waiting guests seated on the beach. When the meal is over the refuse is disposed of in the sea (a strong undertow instantly carries it away). The sea also serves as a giant finger bowl and the beach sand as effective napkins. In minutes all evidence of any feasting is gone.

And now for dessert. A favorite in Palau in the Caroline Islands is Soursop Ice Cream. Soursop is a large fruit of the American tropics now grown in tropical areas the

Cartoon by Marion Pahl

world around. It is a relative of the custard-apple. The ingredients needed for Soursop Ice Cream are:

½ T gelatin
2 T cold water
⅓ cup boiling water
1 cup soursop juice
1 cup sugar
1 cup whipped cream

Soak gelatin in cold water and pour into boiling water until dissolved. Add soursop juice and sugar. Cool. Fold in whipped cream and freeze as you would ice cream.

BANANA SPLIT INDONESIENNE

From Indonesia comes another dessert suggestion, Jakarta Delight. For this refreshing treat you'll need:

6 bananas
1 cup orange juice
1 cup brown sugar
½ cup grated coconut
½ cup dry bread crumbs
(or cake crumbs)
¼ tsp. nutmeg
¼ tsp. cinnamon

Place split bananas in buttered baking dish. Mix orange juice and sugar and pour over bananas. Mix together crumbs, coconut, and spices and sprinkle over top. Bake for 20 minutes. Serves 6.

Mangoes are fast becoming a favorite fruit in the United States. But North

(*Continued on page 6, column 1*)

THE ARCHAEOLOGY OF ENVIRONMENT, GREAT LAKES AREA

By GEORGE I. QUIMBY
CURATOR OF NORTH AMERICAN ARCHAEOLOGY AND ETHNOLOGY

PRIMITIVE CULTURES, especially those of hunting peoples, are much more dependent upon the physical qualities of environment than are the urban cultures of civilized peoples. Other factors being equal, the physical environment not only limits the culture of hunting peoples but may even determine the forms that the culture will take.

During most of the past 12,000 years the upper Great Lakes area was the homeland of a succession of primitive hunting-cultures manifesting traditions of the Paleo-Indian and Archaic stages.

These primitive Indian cultures must have been closely tied to their environments through the interaction of habitat and culture. Yet late glacial and postglacial geological data as well as climatic information derived from analysis of fossil pollen indicate that these Upper Great Lakes environments were constantly changing.

With these changes and differences in environment there must have been corresponding differences and changes in the cultures. Thus in order to arrive at any reasonable understanding of the cultural archaeology of the Upper Great Lakes region it is first desirable to know the archaeology of the physical environment.

OUTLINE BY PERIODS

In the following sections the archaeology of environment will be briefly presented in terms of the geochronological periods outlined in a previous article (BULLETIN, June, 1957).

Late Cary (11,000 B.C. to 10,000 B.C.). During Latest Cary, a period beginning some time after 11,000 B.C. and ending about

11,000 B.C. to 10,000 B.C.

10,000 B.C., glacial ice covered most of Ontario, much of northern Michigan, and a part of northeastern Wisconsin.

Large glacial lakes with water planes much higher than those of the present occupied the basins of Lake Michigan and Lake Huron south of the ice front, but the Lake Superior basin was entirely covered by ice. West and northwest of the Lake Superior basin was a tremendous glacial lake. Lake Agassiz, as this now-extinct lake is called, occupied parts of western

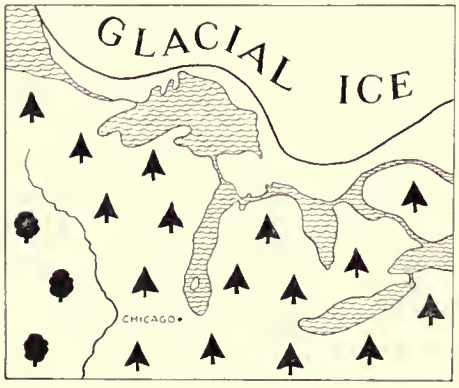
This is the third in a series of articles in which Curator George I. Quimby is tracing the history of the Indians who inhabited our own Great Lakes region from the earliest times and the factors that changed the course of their lives from one period to another. The previous articles appeared in the May and June Bulletins.

Minnesota, eastern North Dakota, and most of Manitoba.

The ice-free portions of the land in the Upper Great Lakes region were covered by forests of spruce and fir possibly separated from the glacial front by a narrow strip of tundra. The climate of this period was certainly much colder and probably wetter than now.

The animals living in the ice-free portions of the land included mammoths, mastodons, giant beavers, deer, elk, and barren-ground caribou. Sea mammals inhabiting the glacial lakes ponded by the ice were whales of several species and walruses.

Two Creeks Interstadial (10,000 B.C. to 9000 B.C.). With the retreat of the Cary ice



10,000 B.C. to 9000 B.C.

to a position north of the Straits of Mackinac the Huron and Michigan basins were

STAGE BY STAGE

The changes described in Curator Quimby's article are traced in chronological order on the seven maps of the Upper Great Lakes area. The lakes are indicated by wavy lines, coniferous forest by triangular tree-symbols, deciduous forest by rounded tree-symbols, and grassland by short lines.

Maps by Gustaf Dalstrom

ice-free. So were parts of the Superior basin because Lake Agassiz drained eastward into it at this time and was considerably lowered if not temporarily dry. The ice east of the Huron basin had retreated in a northerly direction opening low outlets, one of which drained to the Lake Ontario basin and another that drained via the Ottawa River to a marine embayment in the upper St. Lawrence River valley. The western Great Lakes, by draining through these newly opened outlets were considerably lowered (probably some hundreds of feet) beneath their previous levels. The greatly reduced lakes in the Michigan and Huron basins comprise the Bowmanville low-water stage.

During the Bowmanville stage much more land would have been available for Paleo-Indian occupancy than heretofore because the lowered water-planes exposed former lake-bottoms.

The drainage of all the Upper Great Lakes at this period was eastward to an arm of the ocean in the St. Lawrence Valley. Lake Agassiz drained to the Superior basin, which in turn drained either to the Michigan or Huron basins. The Michigan basin drained to the Huron basin and the Huron basin drained to the ocean through one of the outlets, probably at North Bay.

The land was covered by a forest in which spruce and fir were dominant. Other trees known to have been present were tamarack, pine, oak, ash, linden, and cedar.

The climate seems to have been cooler and probably moister than that of the present time.

The animals living in the region included mastodons, giant beavers, deer, elk, and barren-ground caribou. Sea mammals were whales and walruses, which, in small numbers, may have entered the Lake Huron basin from the ocean by way of the Ottawa River and the North Bay channel.

Valders Glacial Advance (9000 B.C. to 8500 B.C.). The Bowmanville low-water

9000 B.C. to 8500 B.C.

stage and the Two Creeks Interstadial were terminated by the advance of the Valders

glacier. Once again the ice pushed southward over the forests, filling the Lake Superior basin, crossing the Straits of Mackinac to cover northern Michigan and parts of northeastern Wisconsin, and blocking the outlets to the sea east of the Huron basin.

The water levels in the ice-free parts of lake basins dammed by the glacier rose to high levels. The water plane in the Lake Michigan basin, for instance, rose to 620 feet above present sea level. Lake Agassiz with its low eastern outlet blocked by ice in the Lake Superior basin rose to its old beach-levels and drained southward to the Mississippi River.

On and on came the Valders ice loaded with red clay and rock debris picked up in the Lake Superior region. In the Lake Michigan basin the ice reached as far south as the present-day sites of Milwaukee, Wisconsin, and Muskegon, Michigan.

Shortly after reaching its maximum spread the Valders ice sheet began to retreat rapidly. The depositional features left by the melting ice are all relatively thin and indicative of a rapid retreat. But the deposits left by the Valders ice are all easily recognizable because of their red coloring.

The ice-free portions of the land still maintained a forest dominated by spruce and fir trees, and this forest seems to have extended right up to the ice margins. The climate was still cool and moist, but it was getting progressively warmer.

The inventory of animal life was the same as the previous period. Mastodons were still abundant and a few whales at least were in the waters of the Huron basin.

Valders Retreat (8500 B.C. to 7000 B.C.). As the Valders ice retreated the Huron and

8500 B.C. to 7000 B.C.

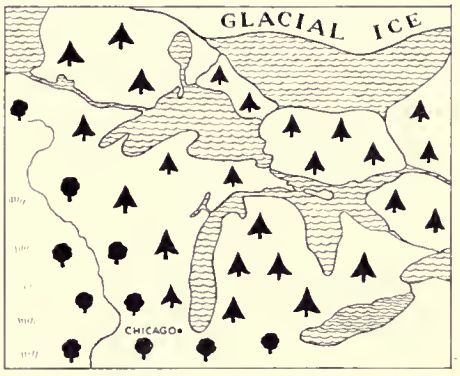
Michigan basins were joined across the ice front, first at a level of 620 feet, then at 580 feet, and finally at 605 feet above the present sea level. The 580-foot level may represent an oscillation of ice blocking the Kirkfield outlet east of the Huron basin. In any event, the longest part of this segment of the Valders retreat is the Lake Algonquin stage, a glacial lake in the Huron and Michigan basins with a water plane 605 feet above present sea level and discharging at Chicago and Port Huron.

Just before the Lake Algonquin stage the ice had retreated from northeastern Wisconsin allowing Later Lake Oshkosh, a small glacial lake, to drain to extinction and from the western half of the Superior basin allowing Lake Agassiz to drain eastward again.

During the time of Lake Algonquin the ice extended from north of Lake Agassiz to the eastern half of the Superior basin, across the northeastern part of the Huron basin, and as far south as the Kirkfield outlet east of Georgian Bay.

The land areas were still covered with forests in which spruce and fir were dominant and the climate was still cooler and moister than at present. The forest-dwelling animals included mastodons, deer, elk, barren-ground caribou, and probably giant beavers. Whales probably still lived in the waters of the Lake Huron basin.

Late Valders Retreat (7000 B.C. to 6000 B.C.). About 7000 B.C. or shortly before,



7000 B.C. to 6000 B.C.

the Valders ice retreated from the Kirkfield outlet east of Georgian Bay and the waters of Michigan and Huron basins drained eastward at successive falling levels. First came the Wyebridge stage at 515 feet above present sea level, next the Penetang at 475 feet, then the Cedar Point stage at 475 feet, followed by the Payette level at 415 feet, and finally lower stages not yet studied.

During this period the ice retreated from the North Bay outlet and from the northeastern part of the Lake Superior basin. Lake Agassiz, still a large glacial lake, drained eastward into the Superior basin. Northeast of Lake Superior a new glacial lake was forming between the height of land and the ice front.

In this period the composition of the forests was changing. Spruce and fir were waning while pine was expanding.

Animal life in the southern half of the region was changing too. The mastodons were disappearing, either becoming extinct or moving northward. Among the animals remaining were the deer, elk, and barren-ground caribou and probably whales.

Terminal Glacial (6000 B.C. to 3000 B.C.). By the beginning of this period the ice front had retreated to a point near Cochrane, Ontario. Between the ice front and the height of land there was a tremendous glacial lake called Ojibwa-Barlow. It lay

6000 B.C. to 3000 B.C.

east of Lake Agassiz and north of the Lake Huron basin and drained southward either into the Huron basin or into the Ottawa River.

Lake Agassiz, still a glacial lake but probably somewhat reduced in size, drained eastward into the Superior basin.

The Superior, Huron, and Michigan basins had extraordinary low water-levels. Lake Stanley in the Huron basin had a water plane about 180 feet above present sea level. This was 400 feet beneath the modern level of Lake Huron. Lake Chippewa in the Michigan basin had a water plane of 230 feet and was 350 feet below the level of modern Lake Michigan. Lake Chippewa drained to Lake Stanley through a long river that passed through the present Straits of Mackinac. Lake Stanley drained to the ocean via the North Bay outlet and the Ottawa River. Lake Superior, lowered in level some hundreds of feet, drained at least to the level of the sill in the St. Mary's River and may have drained lower through northeastern outlets to Lake Ojibwa-Barlow.

By about the middle of this period the ice front in the vicinity of Cochrane, Ontario, retreated allowing Lake Ojibwa-Barlow to drain northward and become extinct shortly thereafter.

The forest-cover of the land surrounding the lakes was changing in response to an increasingly warmer and drier climate. During the first half of the period pines achieved dominance of the forest from Minnesota to southern Michigan as the spruce-fir zone migrated northward. With the dominance of pine came an increase in the expansion of grasslands, particularly in the western parts of the area and between Lake Agassiz and the Superior basin.

In the latter half of the period the pine dominance began to give way to the expansion of hardwood forest with oak and

(Continued on page 7, column 1)

EXOTIC RECIPES—

(*Continued from page 3*)

Americans usually sample only the domestic fruit, which is quite fibrous. The wild mango, we are assured, is an exceptional treat when one becomes accustomed to its slightly turpentine-like flavor. An extremely juicy fruit, one zoologist advises that the best place to eat wild mangoes is in the bathtub! Green-mango sauce known as chutney is highly recommended too. Mangoes that are still hard and just beginning to turn in color should be selected, then peeled, and cut across the fibers. Next, boil the pieces in sugar as you would apple sauce.

If you feel reluctant to try any of the food preparations suggested above, it is well to remember that food habits vary sharply throughout the world and even in our own country where the eating habits of persons in one state would shock those of another state. In the United States we consider eating animal entrails (a common practice in many countries) repulsive and yet we forget that the casings of hot dogs (a food which is almost synonymous with America) are made from that very material.

As we learn more about and from people of other countries and cultures our preparation and consumption of food should become more interesting and should provide more fun, too.

Americanization Classes 'Graduated' at Museum

At ceremonies held in James Simpson Theatre of the Museum on June 11, approximately 1,200 "new Americans" as selected delegates of more than 4,000 "graduates" received diplomas and certificates for completing courses that prepare them for life in their adopted homeland. The occasion was the annual "commencement" exercise held for many years in the Museum by the Division of Americanization of the Chicago Public Schools. Those "graduated" were adults of all ages who had come to the United States from many lands, some as refugees from totalitarian rule. Those who had completed advanced courses received diplomas; others received certificates of progress for their accomplishments to date.

Two Museum Anthropologists Awarded Ph.D. Degrees

In June two members of the staff of the Department of Anthropology were awarded the degree of Doctor of Philosophy. They are M. Kenneth Starr, Curator of Asiatic Archaeology and Ethnology, and Miss Elaine Bluhm, Assistant in Archaeology. Dr. Starr's degree was bestowed by Yale University. The title of his thesis is "Some Regional Ceramic Groups of the Chou Period: Southwest and Southern China." Dr. Bluhm's degree was conferred by the University of Chicago. Her thesis is entitled "Prehistoric Settlement Patterns in the Southwest." Dr. Bluhm has resigned from the Museum staff in order to engage in special work with the Illinois Archaeological Survey for the University of Illinois.

MUSEUM REPRESENTATIVE AT AFRICAN MEETINGS

Rudyerd Boulton, Research Associate in the Division of Birds, will represent the Museum at the Pan African Ornithological Congress to be held at Livingstone, Northern Rhodesia, from July 15 to 22 and at the meeting of the International Committee for Bird Protection to be held at Bulawayo, Southern Rhodesia, on July 8.

After these meetings Mr. Boulton plans to spend several weeks in Angola, where he will continue his long-time interest in collecting material on the birds of Angola, paying particular attention to the ecological aspect of the bird life. He expects to travel extensively over the great network of roads that the Portuguese have established and that now reach many parts of the country previously difficult of access. This will take him from the borders of the Congo forest to the Mossamedes Desert.

STAFF NOTES

Dr. Robert H. Denison, Curator of Fossil Fishes, is on a field trip in the vicinity of Silver Creek, New York, to collect fossil specimens in late Devonian black shales. On the earlier part of the trip he was accompanied by **Dr. Rainer Zangerl,** Curator of Fossil Reptiles .... **Dr. Everett C. Olson,** Research Associate in Fossil Vertebrates at the Museum, was recently appointed chairman of the Department of Geology at the University of Chicago .... **Dr. Julian A. Steyermark,** Curator of the Phanerogamic Herbarium, attended the recent annual meeting of the Missouri Chapter of Nature Conservancy at the University of Missouri, where he spoke on "Plant Extinction Threats in Missouri." He was also principal speaker at the convention of the Federated Garden Clubs of Missouri at Poplar Bluff .... **Philip Hershkovitz,** Curator of Mammals, **Luis de la Torre,** Associate in the Division of Mammals, and **Sophie Andris,** Osteologist, attended the recent annual meeting of the American Society of Mammalogists in Lawrence, Kansas.

Primitive tribes of the Andaman and Nicobar islands in the Bay of Bengal are represented by a collection in Hall L.

PHILIPPINE BIRDS—

(*Continued from page 2*)

arrangement with Dr. Rabor, who teaches biology most of the year in Silliman University. But in vacation periods he's in the field as much as possible. We help him finance his expeditions and he sends us collections. He's explored Negros intensively, and I was privileged to be in the field with him in 1953–54 there and on nearby Siquijor. He's also covered Bohol, another of the central islands, and both the lowlands and the highlands of Zamboanga Peninsula, the westernmost part of Mindanao. The Zamboanga Peninsula proves to be so different from the rest of Mindanao that it well could be a separate island. This year's collection from there, from Mount Malindang, contains rarities and novelties I haven't seen equaled in a collection since I was studying birds in the snow mountains of New Guinea. It was from this collection that the four new birds I've just described came—a nuthatch, a creeper, a flowerpecker, and a sunbird.

MANY TASKS REMAIN

The number of new forms described from the Philippines in the past ten years, two or three score, indicates the recent progress that has been made in itemizing Philippine birds. But these published descriptions of new birds are available to only a few specialists. They must be combined into checklists, handbooks, and manuals to be generally available. The Philippines have had their share of them. That of R. C. McGregor of Manila, published in 1909; that of M. Hachisuka, started in the early 1930's but not finished; and that of J. Delacour and E. Mayr, published in 1946. But as each gets out of date, a new one is needed adding new data and utilizing new concepts. I am incorporating the new data into a new "List of Philippine Birds." It was written by 1953, but the flood of new material makes many additions necessary, and I can't call a halt until after I've finished working out the magnificent 1956 collection from Mount Malindang made by Dr. Rabor.

Such inventories as checklists and manuals are needed for every group of animals and for every part of the earth, if we're to know what is on it. Some areas such as Europe and the United States have so many resident naturalists studying animals that in general our Department of Zoology directs its interests to other lesser known areas. Through a combination of circumstances we got a good start in Philippine birds, and our labors have been fruitful.

Exhibits showing rocks and tracing the geologic history of the Chicago region have been installed on the walls of the corridor between Halls 34 and 35.

CHARACTER SKETCHES BY A WORLD-ROAMING ARTIST

JAVANESE DANCER
Portrait by Elisabeth Telling

"PEASANTS AND PRINCES: Portraits of Human Types in Indonesia and Central America" is the title of a special exhibit in Stanley Field Hall of the Museum from July 1 through Labor Day (September 2). It is a collection of 45 charming pastel drawings by Elisabeth Telling of some of the interesting personalities she has encountered in many years of travel. Miss Telling, a native of Chicago, has lived in recent years (when not roaming to far-off places) near Guilford, Connecticut.

With a fine eye for detail, Miss Telling records the characters and moods of her subjects as well as their physical traits. From an anthropologist's point of view her drawings are accurate representations of the peoples of the countries she has visited, but they are also interesting as studies of individual human beings and noteworthy as artistic creations. Among persons of various classes and ethnic groups portrayed in this series of her drawings are a Balinese princess, temple dancers of Bali, Java, and Thailand, a prince regent of Java, and a medicine man of a Guatemalan Indian tribe.

The collection is a gift to the Museum from Miss Telling, in recognition of which the Trustees elected her a Contributor.

GUATEMALAN INDIAN
Portrait by Elisabeth Telling

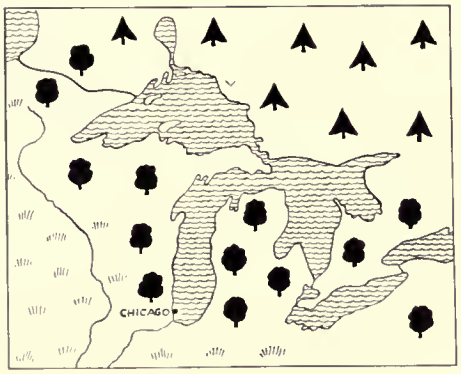
GREAT LAKES AREA—

(*Continued from page 5*)

chestnut, and the grasslands increased still more their encroachments into the forests. By the end of this period the climate was hotter and drier than that of today.

Except perhaps in the far north, the mastodons were gone from the region. But deer, elk, barren-ground caribou and whales were among the animals still dwelling in the area. There is some evidence suggesting the presence of horses, now extinct, and bison in the western parts of the region during part of this period. Dogs of several kinds made their first appearance in association with primitive Indian cultures.

Early Post-Glacial (3000 B.C. to 1000 B.C.). Although the glacier had retreated from the upper Great Lakes area, its former presence was being manifested in a peculiar way. The land, which had been compressed by the tremendous weight of the ice, had been rising rapidly for less than 3,000 years. In places this rise amounted to about 400 feet, suggesting a rate of upwarping greater than one foot every ten years. The upwarping raised the North Bay outlet thus causing the waters of the upper Great Lakes to rise to levels controlled by outlets at Chicago and Port Huron, and for the first time the waters of the Huron, Superior, and Michigan basins were merged into one great lake. This was the Nipissing stage with a water plane 605 feet above present sea level.



3000 B.C. to 1000 B.C.

South of the unwarped areas the high waters of Lake Nipissing reached the levels they had attained 5,000 years earlier. Many places that had long been dry land were once again under water, and in the north large areas were under water for the first time since the ice had left.

During the Nipissing times the forests dominated by oak and hickory achieved their maximum extension northward. This also was the period of the greatest expansion of the grasslands. It was also the time of the hottest and driest climate known in North America during the last 20,000 years.

Deer and elk were among the animals living in the region during Nipissing times. Whales may have lasted until Nipissing times because whale remains have been found enclosed in a Nipissing beach in Michigan.

Post-Glacial (1000 B.C. to 500 B.C.). The waters of Lake Nipissing were lowered by down-cutting of their outlets. For a time between 1000 B.C. and 500 B.C. the levels in the Huron and Michigan basins were stabilized with a water plane at 596 feet above present sea level. This is the Algoma stage.

Around 1000 B.C. there was an abnormally cold period but it did not last for many years. The northern lands continued to rise, but at a much slower rate than previously. The upwarping since Nipissing times is about 80 to 100 feet in some places.

After the Algoma stage the upper Great Lakes took on their modern appearance and the flora and fauna were essentially as they were at the time of the arrival of European explorers.

This outline of the archaeology of the Upper Great Lakes environment gives some indication of the great variability from one period to another. It shows quite conclusively that it is a mistake to consider environment a constant when studying prehistoric Indian cultures of the Upper Great Lakes.

Curator Force Honored

Roland W. Force, Curator of Oceanic Archaeology and Ethnology, has been honored by appointment as a member of the Standing Committee on Museums and Pacific Research of the Pacific Science Association. Meetings of the association are held only every four or five years. The next meeting will be in Bangkok, Thailand, November 18–December 9 this year.

SIX SUMMER MOVIES FOR CHILDREN

On six Thursday mornings during July and August, free programs of color motion-pictures will be presented in the James Simpson Theatre of the Museum under the auspices of the James Nelson and Anna Louise Raymond Foundation. There will be two showings of each program, the first at 10 and the second at 11 or 11:15 (see below). The first program will be on July 11, the last on August 15. No tickets are needed. Children may come alone, accompanied by parents or other adults, or in organized groups. Following are the dates and titles:

July 11—DUMBO (*10 and 11:15 a.m.*)
Disney's story of a baby circus-elephant (*repeated by request*)

July 18—WATER BIRDS (*10 and 11 a.m.*)
One of Disney's "True-Life Adventure" movies
Also a cartoon

July 25—THE LIVING DESERT (*10 and 11:15 a.m.*)
One of Disney's "True-Life Adventure" movies.

August 1—CURIOUS ADVENTURES OF MR. WONDERBIRD (*10 and 11:15 a.m.*)
A fairy tale in animated-cartoon style

August 8—THE ALASKAN ESKIMO (*10 and 11 a.m.*)
One of Disney's "People and Places" movies
Also a cartoon

August 15—HEIDI AND PETER (*10 and 11:15 a.m.*)
Sequel to the well-known story of a little girl who lived high in the Swiss Alps

Seats may be reserved for Museum Members and their children until the hour of the program. Adult leaders of groups are requested to remain seated with their groups during the entire program.

COOL ADVENTURES FOR CHILDREN

Two activities ideal for scorching summer days, "Around the World on Wings" and an "Eskimo Seal Hunt," will be featured this summer for children at the Museum.

"Around the World on Wings" (Museum Journey No. 10) is offered to all boys and girls any day during July and August. On this Journey the travelers go to many parts of the world to see birds such as the crowned cranes of the Nile marshes and the emperor penguins of Antarctica and then come home to see the resident birds of the Chicago area. Journey No. 10 was planned by Ellen Miller, of the Raymond Foundation.

Boys and girls who answer correctly the questions in this Journey's instructions (obtained at the north or south entrance of the Museum) and complete three other Journeys are eligible to become Museum Travelers and receive a special award from Dr. Clifford C. Gregg, Director of the Museum. Those who fulfill the requirements for eight Journeys can become Museum Adventurers, and another seal is added to their award.

Members of YMCA summer day-camps can pick up mythical Eskimo garb, kayaks, harpoons, and dog sleds and set out on an imaginary Eskimo seal-hunt after seeing the movie "Angotee," the story of an Eskimo child. This project for YMCA groups begins this month and continues through the summer. Groups are limited to 70 persons and reservations should be made at least one week in advance. Instructions, including questions about things to be found on the seal-hunt and suggestions for other camp programs, are available. Edith Fleming, Raymond Foundation lecturer, is in charge of this program.

GIFTS TO THE MUSEUM

Following is a list of the principal gifts received during the past month:

Department of Anthropology:

From: Philip Pinsof, Wilmette, Ill.—4 Japanese and Chinese objects; Robert Trier, McKenzie Bridge, Ore.—stone figure, Borabora Island, Polynesia; Mrs. Carl F. von Gunten, Wheaton, Ill.—tapa cloth "poncho" and sample of bark cloth, Tahiti

Department of Botany:

From: Holly Reed Bennett, Chicago—344 unmounted plant specimens, Michigan; Dr. Henry Field, Coconut Grove, Fla.—3 marine algae and a bladderwort; Regional Plant Introduction Station, Ames, Iowa—seeds of *Sorghum vulgare* var. *saccharatum*

Department of Geology:

From: Mrs. Walter Douglas, Chauncey, N.Y.—specimen of petrified wood, Arizona; A. R. Hotchkiss, Evanston, Ill.—mineral specimens, Minnesota; Roy Sturtevant, Chicago—specimen of dendritic sandstone, Arkansas

Department of Zoology:

From: Karl Bartel, Blue Island, Ill.—16 gall-wasps; Gary Billingsley, Alpine, Tex.—a fairy shrimp; W. E. Eigsti, Hastings, Nebraska—3 lots of ectoparasites, Nebraska and Florida; Rodolfo Escalente, Montevideo, Uruguay—a birdskin; U. S. Fish and Wildlife Service, Seattle, Wash.—5 fishes, Pacific Ocean; U. S. Fish and Wildlife Service, Pascagoula, Miss.—collection of invertebrates, Gulf of Mexico, and 36 lots of fishes, Atlantic and Pacific oceans; Harry Hoogstraal, Cairo, Egypt—a bat, 41 birdskins; University of Illinois, Urbana—a blind cavefish, Indiana; University of Michigan, Ann Arbor—5 lots of land-snails, New Hebrides; Dr. Cornelius B. Philip, Hamilton, Mont.—6 Tabanid flies, Malaya, Manchuria, Philippines

SUMMER LECTURE-TOURS GIVEN TWICE DAILY

During July and August, guide-lecture tours of Museum exhibits will be offered in both the mornings and the afternoons of weekdays, Mondays through Fridays inclusive. There will be no tours on Saturdays and Sundays or on July 4, but the Museum will be open during regular visiting hours, 9 A.M. to 6 P.M. on those days.

Except on Thursdays, the morning tours will be devoted to the exhibits in one department of the Museum. All afternoon tours (and also the tour on Thursday morning) will be comprehensive in scope, including outstanding exhibits in all departments. Tours are conducted by lecturers of the Raymond Foundation staff. Below is the schedule that will be followed weekly in July and August:

Mondays: 11 A.M.—People and Places
2 P.M.—Highlights of the Exhibits

Tuesdays: 11 A.M.—The World of Plants
2 P.M.—Highlights of the Exhibits

Wednesdays: 11 A.M.— The Earth's Story
2 P.M.—Highlights of the Exhibits

Thursdays: 11 A.M. and 2 P.M.—Highlights of the Exhibits

Fridays: 11 A.M.—The Animal Kingdom
2 P.M.—Highlights of the Exhibits

NEW MEMBERS

(May 16 to June 14)

Contributors

Holly Reed Bennett, Dr. Clifford C. Gregg, Henry P. Isham, Dr. Paul S. Martin, William H. Mitchell, Philip Pinsof

Associate Members

James B. Blaine, W. T. Chester, Mrs. Helen James Douglass, Meyer Field, Miss Anne Fleischman, Dr. Paul H. Holinger, L. Richard Smith, John M. Weaver

Sustaining Members

John KcKinlay, Jr., W. S. Kinkead

Annual Members

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Bulletin

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Shark Hunting—in Indiana

Chicago Natural History Museum
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Roosevelt Road and Lake Shore Drive, Chicago 5
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Members are requested to inform the Museum promptly of changes of address.

MUSEUM'S SPRING COMES EARLIER EVERY YEAR

BY MIRIAM WOOD
CHIEF, RAYMOND FOUNDATION

To this Museum, as to most others, spring means throngs of school children and students coming by buses, cars, trains, and afoot. Some come only a few city blocks to reach the Museum; others travel here from cities, towns, villages, and farms hundreds of miles distant. They range in age from five years up to students of high schools and colleges. All these groups have one thing in common—a curiosity about the world around them. And what better place could there be to satisfy this than the Museum?

These crowds used to come mainly in the month of May, but in recent years the spring influx has been starting in March and continuing through the middle of June. During this year's season, students came to Chicago Natural History Museum from twenty-six states and from Alaska, Puerto Rico, and Canada. There were 2,302 groups totaling 105,050 students during the three and one-half month period. More came in March than ever before, but further increases all through the period kept May at the top as the month with the largest numbers of students. May is usually a month of good weather, and at the schools it is the time for study-reviews and field trips.

Fridays are the outstanding days for visits by groups, and this year, on Friday, May 17, the Museum received the phenomenal number of 89 school groups, the all-time record. More than 4,100 individuals were included in this day's groups. However, this total number of students was exceeded on a Saturday (May 4) when 4,329 individuals arrived, although the number of groups (37) was smaller. Most of this welcome invasion by young folks came to the city on three special trains. Such trainloads of Museum-bound students are frequent, especially on Saturdays.

Many of these students and their accompanying teachers know in advance what they want to see and how to go about it. Many others need and request the assistance of the seven guide-lecturers on the staff of the James Nelson and Anna Louise Raymond Foundation for Public School and Children's Lectures. This educational division of the Museum plans many kinds of tours and programs to assist school groups as they study the exhibits. During the three and one-half spring months of 1957 the Raymond Foundation gave assistance to 1,014 groups comprising 37,078 students, in addition to entertaining 6,532 children at nine Saturday-morning motion-picture programs in the James Simpson Theatre.

LEARN TO LIVE, LIVE TO LEARN

Typical of Raymond Foundation activities is the special school-program "Scientific Hobbies." Shown here are sixth-grade students, under the guidance of Lecturer Maryl André, learning of new pursuits to fill their summer-vacation time—in this case, shell-collecting. Above them an octopus spreads its tentacles.

These numbers are impressive, but they do not tell the whole story. Basically we are more interested in the results that no statistics can reveal—how much the Museum's efforts contribute to a broader education for the children participating in these activities.

THIS MONTH'S COVER

Mecca Quarry, the source of the Coal Age black shale that is the core of the Mecca Project of the Department of Geology, is shown here as seen from the hillside above it at the time the last of the shale was being loaded into trucks for transportation to the Museum. In the quarry are (left to right) Dr. Rainer Zangerl, Curator of Fossil Reptiles, William D. Turnbull, Assistant Curator of Fossil Mammals, and Peter Garrison, student-worker from Antioch College. The scientific importance of the fossil sharks from this quarry and other localities in Parke and Vermillion counties, Indiana, is explained on page 3 by Dr. Eugene S. Richardson, Jr., Curator of Fossil Invertebrates.

We wish to give one message to school authorities and teachers and to students themselves: We welcome all these groups that come in the spring, but we should like to have them spread out through a greater part of the year. If students and teachers will plan their visits for the less-busy months, they will gain much more from their trips to the Museum and will certainly enjoy them more. The months from September through February are wonderful times for Museum visits.

HOUSECLEANING REVEALS RARE TAPA CLOTH

While sorting through some of the contents of her attic recently, Mrs. Carl von Gunten of Wheaton, Illinois, came across an interesting article of clothing that had been occupying a place in her home for many years. Made of tapa cloth (inner bark of a tree that has been soaked and pounded until thin and pliable) the garment came into Mrs. von Gunten's family when a distant English relative (born in 1765) acquired it in his travels. The garment, which is a poncho with a cord sash, was brought to America in the early 1900's by Mrs. von Gunten's father after he had settled a family estate. Now the garment is in the Museum's anthropological collections, a gift from Mrs. von Gunten.

Roland W. Force, Curator of Oceanic Archaeology and Ethnology, estimates that the tapa cloth, which is in excellent condition, is about 150 years old. Its fragile leaf-design suggests that it might have come from eastern Polynesia, although the garment's style and sash are not typical of clothing worn in that area.

RARE 250-MILLION-YEAR-OLD SHARKS FOUND IN INDIANA

By EUGENE S. RICHARDSON, Jr.
CURATOR OF FOSSIL INVERTEBRATES

IT IS NOT OFTEN that a cartoon situation comes to life to plague us, but perhaps we brought it on ourselves. Two years ago we were fortunate in having a talented young cartoonist, Robin Rothman, working with us in the Department of Geology as an assistant under the Antioch College work-and-study program.

'ANYONE FOR PICKAXES?'

This frustrating situation is actually a classical predicament of fossil collectors, but the members of the Museum's Mecca Project felt that the long arm of coincidence had stretched too far when this really happened to them after Cartoonist Robin Rothman had made this prophetic drawing of their Indiana dig.

She not only cartooned our work on the Mecca Project and other phases of Museum life but produced the accompanying drawing of a not uncommon impasse in the life of any fossil collector. Perhaps it is inherent in the perverseness of things that when we have laboriously excavated a supposedly ample cavity in the landscape, we find that it should have been a little bit bigger after all. Or perhaps we never make these holes big enough to begin with. So be it. We showed the cartoon to appreciative groups of scientists at the meetings of the Geological Society of America, the Illinois Academy of Science, and elsewhere. Then, after having thus built up a fine big show of ourselves we suddenly found ourselves hoist with our own petard. This is the tale of our plight and what we have done about it.

It was recorded briefly in a corner of the June BULLETIN that Dr. Rainer Zangerl, Curator of Fossil Reptiles, and I had returned to Parke County, Indiana, to excavate the fossil remains of a large Pennsylvanian (Coal Age) shark. By that time, we had already run up against the cartooned situation. The original discovery of the shark, 250 million years old, had led, in May, to an extension of our proposed 1957 field work, made possible by the Maurice L. Richardson Paleontological Fund. In the last phase of the mapping and reconnaissance work that we carried out during April, we came upon a new exposure of black shale, in a gully behind the farm of Mr. and Mrs. Kenneth Cloyd. We duly noted the exposure among our other data and then had a look for some fossils, since this was the same black shale whose extent and fauna we have been studying for several years. To our great surprise, a piece of shale about a foot square, lying in a small stream at the foot of a sylvan waterfall, split very readily along a major bedding plane, revealing a patch of fossil sharkskin covering the entire surface and obviously forming part of a larger area of skin extending into the formerly adjoining blocks of shale.

AN UNPRECEDENTED FIND

Now, we had never seen a patch of fossilized sharkskin before, nor had anyone else, to our knowledge. Individual scales are common in the Pennsylvanian black shale and in other rocks, but a whole square foot with the scales lying undisturbed in close-packed rows just as the shark wore them? Unheard-of! Obviously, we had to find out where that block of shale had come from. Not from the waterfall itself, we soon learned. But before long we found that it fitted like a piece of a jigsaw puzzle against the rock face of a cliff next to the fall, beneath an overhanging ledge. With our handpicks we removed another block of shale from the exposure. Lo! more shagreen (as sharkskin may be called). With feelings like those of the antiquarians who first broke into King Tut's tomb, we pried deeper. Still more shagreen! Soon, however, we could go no farther without removing the several feet of overlying rock, and for that we lacked both tools and time. Together with two more pieces found in the fallen rock below the cliff, our sample of fossil sharkskin now made a patch of about 2 by 3 feet, with a line of vertebrae running through it.

CONTRARINESS OF FORTUNE

The following week, supplied with picks, shovels, pry-bars, and other tools, and accompanied by Orville L. Gilpin and Bruce Erickson from the Museum's paleontology preparation laboratory, we descended again upon the shark. In two days we dug a hole 16 feet into the hillside, at which point the hole was 8 feet deep: a noble and imposing excavation. Then with tender care we removed the last few inches of overlying shale and lifted the blocks of the "shark level." Showing as shadowy elevations were the buried fins and the rolled-back edge of the skin where it had burst before burial of the shark. We now had about eight feet of shark laid out on the bank, including a Masonite replica of the original pieces, but here we found ourselves in the situation pictured by Miss Rothman. For the shark, instead of following the 16-foot hole that we had laid out for it, turned and ducked under the side wall.

Returning to the Museum, we spent a day X-raying the new additions to the monster. A pair of fins was clearly visible, as was the vertebral column and the base of a skull. But two possible explanations offered themselves. If the fins were the pelvic, or rear, fins, and if the skull belonged to a partly-digested meal in the shark's stomach, we had penetrated only half-way along the creature's length. If the fins were the pectorals and the skull was part of the shark itself, we had most of what was available, the hind-quarters having been removed during the carving of the little valley by the waterfall stream.

SMALLER SPECIMENS ALSO

Accompanied by Gilpin, we returned again and enlarged our pit in the proper direction. Lifting out the slabs of shark-level shale, we soon found that we had the rest of the skull and that there was nothing beyond. The shark was now as complete as could be. Before throwing our excavated material into the valley, we had carefully searched for other blocks that might have fallen from the exposure, and we even walked down the valley, splitting all likely pieces of shale without finding the missing part of our specimen. But on returning to the Museum with our find and examining it in the laboratory, we found that we had not only the one large specimen but skulls and partial skeletons of half a dozen more. The accompanying specimens are of smaller sharks, three- to five-foot animals, all very elegantly preserved, and all of different

NEEDLE-IN-HAYSTACK IS EASIER

Dr. Rainer Zangerl, Curator of Fossil Reptiles, hunting specimens of creatures that lived hundreds of millions of years ago in bed of an Indiana stream.

kinds. One is a complete skull of an *Edestus*, hitherto known only from tooth-bearing spine-like bars about whose position and function there has been a series of

(*Continued on page 7, column 1*)

SOME LITTLE-KNOWN FISHES OF LAKE MICHIGAN

By LOREN P. WOODS
CURATOR OF FISHES

THERE ARE approximately 75 species of fishes in Lake Michigan proper (excluding tributary streams and connecting lagoons), but of these only 10 or 12 are of real commercial importance—namely, chubs (three or four species), lake herring, smelt, yellow perch, whitefish, carp, suckers, and walleye (in order of quantity caught).

The lake trout, formerly the most prized and for many years one of the most abundant food fishes of Lake Michigan, is now so rare that commercial fishermen no longer fish for it. Before 1945, the catch of lake trout in Lake Michigan was four to six million pounds a year.

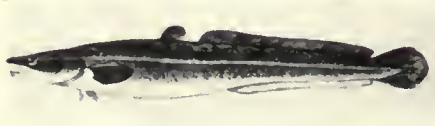
ANGLING

Sport fishing along shore is usually done for yellow perch, but occasionally other kinds, especially lake herring, are caught in late summer. Carp are frequently caught in the open lagoons and adjoining waters. Occasionally a stray whitefish takes a fisherman's bait and more rarely a sturgeon is hooked. In the spring there is considerable activity in connection with the smelt run, both with large dip-nets and small gill-nets. In some parts of Lake Michigan, especially in Green Bay and along the northeastern shore, sport fishermen angle for walleyes, northern pike, and muskellunge.

There are several little-known but very abundant species of lake fishes living along shore or in very deep water. Among these are the ninespine stickleback, trout-perch, deepwater sculpin, slimy muddler, spoonhead muddler, and burbot. Their habits, distribution, and general place in the economy of the lake are only superficially known, and most fishermen do not recognize these fishes by kind. Small fishes, such as these, are important chiefly as food for other fishes and, except for the burbot, none is longer than 8 inches.

BURBOT (LOTA)

The burbot is of great importance because it is a ubiquitous predator. It is a fresh-water representative of the codfish family



From Iowa State Conservation Commission

BURBOT

(BULLETIN, May, 1957) and, like the marine cods, haddock, and pollack, is voracious, eating all kinds of smaller fishes. Burbots are very abundant and the amount of fish they consume is enormous. The first three years of their lives, or until they attain 10 inches in length, they feed on invertebrates and later entirely on fish. When full-grown they are 3½ feet long and weigh from 25 to 30 pounds.

Burbots live in cool and cold lakes and streams in England, across northern Europe and Asia to Alaska, and south to the Upper Mississippi River system and the Great Lakes. They are most active during the night in streams and shallow lakes, but in the deep, dark waters of Lake Michigan they are very likely active at any time. Commercial fishermen market between 75,000 and 100,000 pounds of burbot each year. The burbot is used for food, fertilizer, and cod-liver oil. The liver is enormous, about 10 per cent of the total weight of the fish. The liver oil is quite as potent in vitamins A and D as that of marine codfish.

NINESPINE STICKLEBACK (PUNGITIUS)

Chicago is near the southern limit of the circumpolar range of the ninespine stickleback. This range extends throughout northern Europe and in Asia and North America north of parallel 42°. This small (2 to 2½ inch) cold-water species is ex-

From Commercial Fishes, USSR

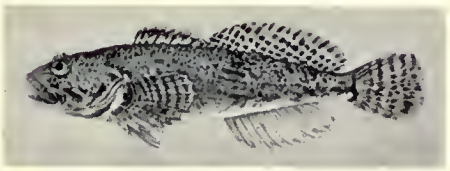
NINESPINE STICKLEBACK

ceedingly abundant at certain seasons in the marginal waters of all the Great Lakes except Lake Erie. Around Chicago they are found in the lagoon entrances of Jackson and Burnham parks. They spawn in the spring, when the male generally builds a nest attached to grass or weeds in which the female lays her eggs. The male guards the nest until the eggs hatch (about twelve days). The food of the stickleback has not been investigated in Lake Michigan, but in other places it is known to be chiefly small aquatic insects and their larvae, small crustaceans, and in summer the fry of other fishes. Sticklebacks are especially important as food for other fishes, especially yellow perch, walleye, and burbot.

DEEPWATER SCULPIN (MYOXOCEPHALUS)

Deepwater sculpins live on the bottom of Lake Michigan and the other Great Lakes in depths of 150 to 600 feet. There is no record that they have been caught in Lake Michigan in water of less depth. They live in darkness and twilight in water that is never more than a few degrees above freezing (39° F.). They are quite abundant 16 to 20 miles offshore in depths of from 250 to 450 feet and are an important food of the burbot and the smaller lake trout (in fact they are seldom seen except when taken from the stomachs of these two species). About the food or habits of deepwater sculpins in Lake Michigan nothing definite is known. Probably these fish spawn in early spring in deep rocky areas and their food most likely consists of aquatic larvae and the inch-long opossum shrimp *Mysis*.

Deepwater sculpins resemble the muddlers but have a more elongate head and body. Their fins are larger than those of muddlers and there are four spines on the gill cover. These little sculpins (maximum length 7 inches) live also in the streams of arctic Canada. The species in the Great



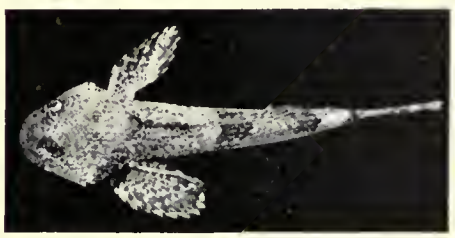
From Iowa State Conservation Commission

SLIMY MUDDLER

Lakes is a fresh-water relict of a marine group of sculpins.

MUDDLERS (COTTUS)

The slimy muddler lives in the rivers and streams tributary to Lake Michigan and in the lake itself down to depths of 400 feet. The spoonhead ranges from shore down to 450 feet but it does not live in streams. Like the deep-water sculpin both muddlers live on the bottom and feed on whatever small aquatic animals are available. Neither



From Cranbrook Institute

SPOONHEAD MUDDLER

of these fishes grows longer than 4 inches and most are 2 or 3 inches long. They are important food for large perch, young lake trout, and burbot.

TROUT-PERCH (PERCOPSIS)

The little trout-perch (6 to 8 inches long) is one of the most interesting of all fresh-water fishes because it is intermediate in structure between soft-rayed and spiny-rayed fishes. The resemblances are indicated by its name, trout-perch. It has a fleshy (adipose) fin between the back fin and tail as do the trouts, whitefish, and smelt, and its ventral-paired fins are midway on the belly as in primitive fishes. It

slightly resembles the perch in having rough-edged scales and one or two spines in the dorsal and anal fins.

This species is known to shore-anglers chiefly from dead specimens found floating near shore or washed up on the beach in late

From Iowa State Conservation Commission

TROUT-PERCH

summer. In spring trout-perch migrate from deep to shallow water, moving alongshore with the smelt toward streams or bays into which they migrate to spawn, and a few are taken in the gill-nets of the smelt fishermen. Trout-perch eat all kinds of small aquatic animals and are, in turn, a principal food of the larger predatory fishes, such as pikes and walleyes.

SOUTH PACIFIC TRIBE HAS '4-H CLUB'

America's famed 4-H Clubs, organized to encourage boys and girls of rural areas to achievement in agricultural pursuits, particularly livestock raising, were anticipated centuries ago in the "pig cult" of a Melanesian tribe living in the New Hebrides Islands of the South Pacific.

While not directly comparable, there is a certain parallelism between the 4-H activities and those of the people on the island of Malekula in the New Hebrides group. In both societies the youths are given livestock to cultivate into animals exceeding the growth they would attain in a natural course of life. In America these cultivated cattle and hogs win prizes at county fairs and livestock expositions and bring fabulous prices in the market. In the Malekula pig cult, the animals, in this case boars, not only are fattened to great size but their tusks are developed into coils exceeding any growth that would occur in nature. The carcasses of these beasts end up in huge ceremonial feasts and the curled tusks become treasures jealously held as family heirlooms.

The American 4-H youth attains honors for his success in cultivating livestock. The Malekula youth gains his first recognition of manhood when he has raised a curled-tusk boar, and then all through his life his rank and privileges as a man grow in proportion to the number of pigs he raises and slaughters. Degree-giving rites are periodically held at which these honors are bestowed. The pigs are ceremoniously killed with shell-bladed axes at the festivals, the number slaughtered at one time sometimes mounting to several hundred during a period of many days' feasting. Pork is the most highly valued of foods among these people.

The curled tusks of the boars are developed by knocking out the lower tusks so that the upper tusks can grow without being worn down. The pigs are usually kept tied up, often right in the house, and are fed soft food. On animals kept this way for years, the upper tusks grow into coils, sometimes two or three complete circles. Tusks with only one full circle are regarded as of great value, those with two coils are regarded as special treasures, and those with three coils attain an importance comparable to crown jewels, and their owners refuse to part with them at any price. For this reason it has been possible to include in the Museum's Malekula pig-cult exhibit (Hall of Melanesia, Hall A, Case 57) examples of only the single and double coiled tusks. Some of the axes used in the ceremonial pig-killings are also shown.

STAFF NOTES

Dr. Julian A. Steyermark, Curator of the Phanerogamic Herbarium, has been named chairman of the Special Volo and Wauconda Bog Committee of the Illinois Nature Conservancy. He recently lectured before the Lions' Club of Wauconda .... **Dr. Donald Collier,** Curator of South American Archaeology and Ethnology, and **Roland W. Force,** Curator of Oceanic Archaeology and Ethnology, attended a two-day conference at Edwardsville, Michigan, sponsored by the Wenner-Gren Foundation for Anthropological Research, to discuss the preparation of an encyclopedia of anthropology .... **Dr. D. S. Rabor,** Field Associate in Zoology and chairman of the division of natural sciences at Silliman University, Philippine Islands, is working in the Museum on Philippine birds with **Dr. Austin L. Rand,** Chief Curator of Zoology .... **Dr. Fritz Haas,** Curator of Lower Invertebrates, attended the recent meeting of the American Malacalogical Union at New Haven, Connecticut .... **Dr. Theodor Just,** Chief Curator of Botany, has been appointed chairman of the Committee for Formulation of Editorial Policy sponsored by the Conference of Biological Editors.

Insect Collecting in the Rockies

Rupert L. Wenzel, Curator of Insects, has begun an expedition of several weeks' duration to collect insects in parts of the Rocky Mountains. He will work principally in the areas south of Raton, New Mexico, near Boulder, Colorado, and in the Big Horn range of Wyoming. His collections will be used in continuation of a long-time research project.

MOVIES FOR CHILDREN CONTINUE IN AUGUST

Three free programs of color motion-pictures for children in the Raymond Foundation's summer series remain to be given in August. Two showings of each program are offered in the James Simpson Theatre of the Museum—at 10 and at 11 or 11:15 (see below). Children are invited to come alone, accompanied by parents or other adults, or in organized groups. Dates and titles follow:

August 1—CURIOUS ADVENTURES OF MR. WONDERBIRD *(10 and 11:15 a.m.)*

A fairy tale in animated-cartoon style

August 8—THE ALASKAN ESKIMO *(10 and 11 a.m.)*

One of Disney's "People and Places" movies

Also a cartoon

August 15—HEIDI AND PETER *(10 and 11:15 a.m.)*

Sequel to the well-known story of a little girl who lived high in the Swiss Alps

Seats may be reserved for Museum Members and their children until the hour of the program. Adult leaders of groups are requested to remain seated with their groups during the entire program.

MUSEUM SCIENTISTS ON TV PROGRAM

Emmet R. Blake, Curator of Birds, will lecture on "Birds of the Chicago Area" on Sunday, August 4, at 9:30 A.M. over TV Station WNBQ (Channel 5). He will illustrate his talk with specimens from the Museum. The program is presented in the series "Live and Learn" sponsored by Northwestern University.

Several other members of the Museum staff have appeared on this program in recent weeks. They are: Loren P. Woods, Curator of Fishes, who spoke on Lake Michigan's finned inhabitants; Dr. Margery C. Carlson, Associate in Botany, who talked on plants of the Chicago area; Dr. Orlando Park, Research Associate in Insects, who lectured on the region's animal habitats, and Dr. Everett C. Olson, Research Associate in Fossil Vertebrates, who discussed the fossils found in the area.

Physical Differences

Human skulls, color charts, casts of hands and feet, and other exhibits showing some of the diagnostic characters considered by physical anthropologists in differentiating racial types are to be found in Chauncey Keep Memorial Hall (Hall 3—Peoples of the World).

Like Some People . . .

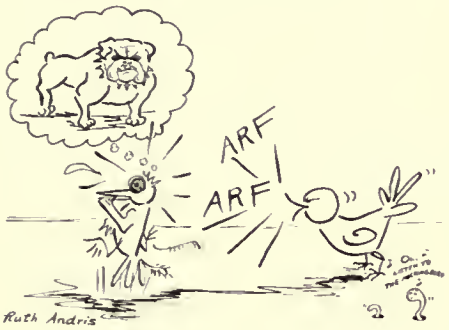
TALKING BIRDS SOUND OFF WITHOUT THINKING

By AUSTIN L. RAND
CHIEF CURATOR OF ZOOLOGY

IF WE CONSIDER imitation as the sincerest flattery, talking birds are certainly flatterers. This perhaps explains in part why talking birds are such popular pets.

In the western world, parrots are best known as talkers, but well known in the Orient are others. J. D. D. La Touche, who studied the birds of China for years, writes that a starling, a favorite cage-bird of the Chinese, is a good talker equal to any parrot.

Better known perhaps is the mynah, a jay-sized black starling with vivid yellow beak and head wattles, that lives from India to Java. Of its voice Stuart Baker writes that like all its near relatives it has a wide repertoire of notes, melodious, noisy, and raucous, and is an admirable mimic, copying the notes of other birds in the wild and learning to talk well in captivity.



Cartoon by Ruth Andris

From this one might conclude that mimicry in the wild would be a good clue as to whether or not a bird could be taught to talk. But what we know of the African grey parrot, reputedly one of the best talkers, does not support this. Dr. J. P. Chapin studied birds for many years in the upper Congo River forests where the African grey is one of the common and conspicuous birds. The notes he heard from it were harsh screeches and pleasant whistles, and he heard no imitative sound from any wild parrot.

MOCKINGBIRD HIGHLY TALENTED

The extreme in mimics is our mockingbird. Its scientific name, *Mimus polyglottus*, means the many-tongued mimic. Its common name in English stresses the same characteristic of the bird. Certainly its record is impressive. A wild bird, singing, has been known to introduce 58 imitations in seven minutes of singing, according to W. L. Dawson. In Boston, C. L. Whittle recorded 39 bird songs, 50 bird calls, and the notes of a frog and a cricket all given by one mockingbird. The mockingbird imitates other sounds, too—the barking of a dog, the squeak of a wheelbarrow—and it even takes an interest in human music. The Grinnells tell of a mockingbird that was attracted to a phonograph on the lawn, apparently studied the music played, and then reproduced it in his song, even repeating piano notes with the phonograph ring. Yet strangely the books at hand say little about this bird's ability to imitate human voices. Perhaps it's only because mockingbirds have not been adequately trained.

Besides the better-known talkers there are other kinds that learn to say a few words, notably ravens, crows, and jays. Perhaps as we get to know them better many songbirds may be found to be capable of saying a few words. But these could be only the birds with better-developed syrinxes because a syrinx, not a larnyx, produces the bird's voice.

Talking birds are presumably playing or doing something in their leisure time. They must be active because it is their nature to exercise their muscles. Some birds just scream, chirp, or sing; some imitate sounds in nature or human speech, while others hop or flit about or soar quietly overhead, each enjoying its activities in its own way. To illustrate the relation between ordinary bird-talk and imitating humans, a lone budgerigar is said to spend much time warbling bird-talk to itself and when trained to "talk" carries on a soliloquy in the same way.

UNAWARE OF MEANINGS

Birds don't understand what they're saying. But as in any training tricks of animals, certain words can be associated with certain conditions and appropriate phrases can crop up in some circumstances. And this, of course, is the beginning of understanding the meaning of speech. But it's so rudimentary that it's hardly as far advanced as the dog that "understands" vocal guides in performing tasks to which it is trained or expression in its master's voice. But again there are reports I simply don't believe, like the story of the Paris clergyman's sparrow that knew the Lord's Prayer and the Ten Commandments. When wild sparrows stole food from behind the bars of its cage it was supposed to say, "Thou shalt not steal."

As a boy I was told the widespread belief that to make a crow talk one should split its tongue. Apparently it's as widespread as the belief that one way to catch birds is to put salt on their tails. But the bird's songbox, the syrinx, is deep in its chest, where windpipes branch into the lungs, and no mutilation of the tongue in its mouth can improve its utterances.

The exhibits of Philippine, Malayan, Indonesian, and Formosan ethnology have recently been renovated in Hall A.

Collector Home From West

Henry S. Dybas, Associate Curator in the Division of Insects, recently returned from a six-week collecting trip in the Pacific Northwest. The purpose of the trip was to collect a poorly understood group of microscopically small beetles that live in the forest floor and in other situations. Laboratory facilities for the special equipment were provided by the University of Oregon at Eugene and by the University of Washinton at Seattle. Alex K. Wyatt, Research Associate in the Division of Insects, joined Dybas for the last part of the field work.

GIFTS TO THE MUSEUM

Following is a list of the principal gifts received during the past month:

Department of Anthropology:

From: Mr. and Mrs. Paul M. Cook, Dunnellon, Fla.—archaeological material, Arizona and Iowa; Miss Frances Glover, Chicago—5 wooden combs, Burma; J. Langewis, Kyoto, Japan—textile sample

Department of Botany:

From: Roy H. Degler, Jefferson City, Mo.—*Viola missouriensis;* Mr. and Mrs. Herbert Pahnke, Chicago Heights—*Podophyllum peltatum* f. Deamii; A. Alvan Vasquez, Iquitos, Peru—6 plant specimens, 5 wood specimens

Department of Geology:

From: Teddy Czyzewicz, Chicago—miscellaneous fossils, Braidwood, Ill.

Department of Zoology:

From: Walter Cherry, Winnetka, Ill.—2,500 sea-shells; Dr. Henry Field, Coconut Grove, Fla.—34 frogs, 56 lizards, 85 millipedes, 42 centipedes; General Biological Supply House, Chicago—13 sea snakes, California and India; Dr. Robert F. Inger, Homewood, Ill.—a fish, Louisiana; Dr. Marshall Laird, Singapore—7 frogs, 12 lizards, 5 snakes; W. H. Phelps, Caracas, Venezuela, a birdskin; Dr. Jeanne S. Schwengel, Scarsdale, N. Y.—49 lots of marine shells; Vernon Wesby, Chicago—3 fishes, northern Manitoba; Loren P. Woods, Homewood, Ill.—25 fishes; Raymond E. Stadelmann, Medillín, Colombia—2 bats; U. S. Geological Survey, Washington, D. C.—12 snails of the endodontid genus *Beilania*, Koror, Palau Islands; Louis and Rua Williams, Bethesda, Md.—a mammal, Honduras; Dr. Charles L. Camp, Berkeley, Calif.—a salamander, a lizard, 3 snakes; Dominion Museum, Wellington, New Zealand—9 lots of land and fresh-water snails, New Hebrides; Michael Duever, Chicago—a rattlesnake; University of Florida, Gainesville—2 fishes; Thomas MacDougall, New York—2 eels; Dr. G. E. Maul, Funchal, Madeira—6 fishes; Dr. Cornelius Philip, Hamilton, Mont.—2 horseflies, Philippines; Dr. Karl P. Schmidt, Homewood, Ill.— 9 lizards, Texas; Dr. Conrad Yunker, Cairo, Egypt.—a lizard; Renato Araujo, São Paulo, Brazil—121 army ants; Carnegie Museum, Pittsburgh—3 fishes, Guam and Colombia; Lloyd G. Gage, Yuma, Arizona—6 species of lower invertebrates, Gulf of California

INDIANA SHARKS—

(*Continued from page 3*)

varying interpretations that our specimen will finally resolve.

Aside from the spectacular quality of the large and well-preserved specimens, the Cloyd Gully sharks are of notable scientific interest. From the Mecca Quarry (see BULLETIN cover) and from localities in the same black shale in several places in Parke and Vermillion counties, Indiana, we had already recovered several hundred specimens of smaller sharks and other marine vertebrates. Those, now in the Museum's research collection and soon to be studied, are the only complete specimens of Pennsylvanian sharks yet found. About seventy years ago, three partial specimens were described from a Pennsylvanian black shale in Illinois by the great paleontologist, Edward Drinker Cope, but he lacked X-ray equipment for properly examining them, and indeed described them without having even removed a layer of overlying shale. Consequently his descriptions are vague and his illustrations, like the specimens, look like meaningless jumbled bumps in the rock. We have those specimens also in the Museum, thus giving us at present a monopoly on all the Pennsylvanian shark specimens in the world.

HURRICANE INTERVENES

This deposit of sharks being of such great scientific interest, we have increased the intensity of our attack upon it. In June we hired a bulldozer and had an area of several thousand square feet exposed, adjoining our small hand-made quarry, with the kind permission of Mr. and Mrs. P. H. Logan, owners of the land. We had intended to stay with it at that time and remove all the specimens in that area, but no sooner had the bulldozer rumbled off up the hill and left us with a veritable banquet before us than Hurricane Audrey, fresh from her foray through Louisiana, dumped nine inches of rain on us in one night. This excessive precipitation brought a considerable amount of clay down from the hillside into the quarry. Another unforeseen effect was the suspending of a good-sized lake above us, like the sword hanging above Damocles. In excavating the new quarry, we had the bulldozer push the clay and rock into the valley, making a dam across the little stream. In the normal course, this would have gradually created a pond on Mr. Cloyd's land while the dam settled and seasoned. However, Audrey filled the pond to overflowing as soon as the dam was built, and part of the face of the dam slipped down into the quarry. Not wanting to be beneath if the 25-foot-deep lake should suddenly drop in on the quarry, we returned to Chicago to let things simmer down. As this is written, we are about to leave again in the hope of finally getting those sharks out of there and back safely to the Museum.

We began the Mecca project with two objects: to collect and study the specimens as a record of the life of a shallow Pennsylvanian sea and to secure evidence on the environment of that sea so that we could give a complete description of the ecology of that time and place. The original Mecca Quarry at about the time of the removal of the last shale from it in 1954 was only about 12 by 15 feet as compared with the 150 by 25 feet of the quarry in Cloyd Gully. The difference in size is significant. In the first case, we found numerous fragments of fossils as well as complete specimens, and the area uncovered provided us with sufficient material for a detailed study of distribution as well as an adequate collection of specimens. In the Cloyd Gully area, conditions were slightly different at the time when the fossils were buried. There are very few fragments of fossils, and the whole specimens are rather better preserved than at Mecca. Both sites were deposited in shallow, quiet, weed-covered water partly closed off from the open sea by bars. While we have not yet seen and evaluated all the evidence in the Cloyd Gully locality, it appears that it was a much less thickly populated area than was Mecca, and that the big shark with its accompanying smaller ones may have come in over the bar during temporary high water only to be trapped there when the water withdrew. In a very short time the water may have become foul, killing the sharks, and so shallow that the bloated carcasses could not float around and scatter. Indeed, there is evidence that the water almost entirely withdrew, letting the cover of floating vegetation down onto the dead animals, thus holding them in place. Following the episode of the burial of the sharks, the water again became several feet deep, and ultimately the barrier ceased to be effective, permitting a normal fauna of marine invertebrates to occupy the area.

While we are busily uprooting sharks from Cloyd Gully in the next few weeks, we will be constantly hoping that Robin Rothman's cartoon will not be prophetic again, and that all of our specimens will stay considerately within the excavated area. For that matter, we also hope that she will not surreptitiously make a cartoon of a hurricane.

Taconite Exhibit

An exhibit of taconite, a low-grade iron ore that is assuming greater importance in our economy because of depleted supplies of hematite, the high-grade ore, has been added to the Hall of Economic Geology (Hall 36). The exhibit includes specimens, a map of known deposits, and a chart illustrating present-day methods of processing taconite for use as a commercial ore.

THROUGH MUSEUM ON WHEELS

During their "Holiday on Wheels," a three-day visit to Chicago by 66 victims of muscular dystrophy, Ward Beckam, of Indianapolis, and Jeannie Arvin, of Lafayette, both 7, and Norma Hank of Indianapolis, office secretary for the Indiana State Muscular Dystrophy Association, pause to see one of the Museum's two marble lions from Peking, China, in Hall 24 (Ancient Chinese Civilization).

Both child and adult muscular dystrophy patients participated in the outing, which included visits to many Chicago landmarks. The trip was arranged by the Indiana State Muscular Dystrophy Association, which has headquarters in Indianapolis.

LAPIDARIES SEEK RECRUITS

Wanted: More "rockhounds."

The Chicago Lapidary Club, which held its Seventh Annual Amateur Handcrafted Gem and Jewelry Competitive Exhibition at the Museum in June, is already preparing for its 1958 show. Persons interested in the hobby of collecting gem materials, polishing them, and making jewelry are urged to get in touch with Tom Priest, secretary of the club, whose address is 2007 Calumet Avenue, Whiting, Indiana. Since the work of preparing exhibits is an exacting process that goes on all year, early contacts are advised. Inquirers will receive an invitation to a club meeting as well as general information.

Museum Invites Children During School Vacation

Every child is invited to make at least one visit to the Museum during the summer vacation that is now in full swing. Parents are reminded that the Museum is a haven of safety for their children—a place where it is cool on sweltering days, where all influences are good, and where education continues while the youngsters are only aware of having fun.

EXPEDITION TO SEEK WYOMING FOSSILS

Fossil mammals of the middle of the Eocene epoch (about 50 million to 45 million years ago) will again be sought by a Museum expedition during August and September in both the upper and lower formations of the remote Washakie Basin in Wyoming. Members of the expedition will be William D. Turnbull, Assistant Curator of Fossil Mammals, and Orville L. Gilpin, Chief Preparator of Fossils, who worked together in the same general region last year.

The isolated area, at an altitude of 7,000 to 8,500 feet, in the Rockies, is one in which little fossil-hunting had been done previously, and last year's collecting was highly successful. Although the objective is to collect the remains of mammalian creatures, well-preserved fossils of reptiles, fishes, and other kinds of animals will be gathered wherever found. In addition, the stratigraphy of the region will be studied.

The ultimate goals of this project are twofold: to acquire a representation of these two Eocene faunas adequate for detailed descriptions and to provide specimens of fossil mammals of a geologic age that has been scantily represented in the Museum's exhibition and study collections.

NEW MEMBERS

The following new Members were elected in the period from June 17 to July 12:

Associate Member

Mrs. John A. Renn

Sustaining Members

Mathon Kyritsis, John McKinlay, Jr.

Annual Members

Ralph K. Ball, Bernard B. Berger, Ivan L. Bielenberg, Lee Bland, Dr. Robert W. Carton, John H. Caster, Mrs. Kathleen Catlin, Dr. Richard S. Cook, Frank R. Dentz, J. W. Didriksen, A. D. Eastman, Harry C. Faust, William E. Fay, Jr., Mrs. Geraldine Gallagher, Frederic Z. Gifford, Abner Goldenson, Cola A. Gray, Mrs. Edward L. Hasler, F. H. Heintz, Grover M. Hermann, Erich Hirsch, Preston H. Holliday, Dr. Jerome Kavka, Mrs. Agnes Lee, Stanley B. Levi, Robert Lundberg, Shaun P. McElhatton, Roswell W. Metzger, Mrs. Thomas S. Miller, Mrs. Charles T. Mordock, John B. Mordock, Dr. Henry B. Okner, Fred T. Reid, Robert G. Roulston, Andrew C. Scott, Dr. F. J. Soltes, Nicholas Starosselsky, E. Norman Staub, Walter Stearns, Edward Sternstein, J. McWilliams Stone, A. P. Stresen-Reuter, David B. Sweeney, Wilbert T. Vaughn, Ward Walker, William A. P. Watkins, Richard O. Westley, David Wheaton, Harold E. Wilson, Rollin R. Young

VOLCANOLOGIST RETURNS FROM LATIN LANDS

After three months of exploring volcanoes in Central America, Dr. Sharat K. Roy, Chief Curator of Geology, has returned to his Museum post. The expedition, one of a series conducted by him for several years, took him to Mexico, Guatemala, El Salvador, Nicaragua, and Costa Rica. His collecting of specimens and studies of these furnaces of the earth have as their final objective a definitive publication on volcanic phenomena. He has been invited to make his contribution on the study of these volcanoes to the Geophysical Year.

Dr. Roy narrowly escaped walking into the crater of Volcan Turialba in Costa Rica during a heavy fog. On another occasion his foot was burned on the seething fumarole of a volcano in El Salvador. He will tell the story of his expedition in an illustrated article scheduled for the September BULLETIN.

TWO LECTURE-TOURS DAILY THIS MONTH

During August, guide-lecture tours of Museum exhibits will be offered in both mornings and afternoons, Mondays through Fridays. There will be no tours on Saturdays and Sundays, but the Museum will be open during the regular visiting hours, 9 A.M. to 6 P.M.

Except on Thursdays, the morning tours will be devoted to the exhibits in one department of the Museum. All afternoon tours (and also the tour on Thursday morning) will be comprehensive in scope, including outstanding exhibits in all departments. Tours are conducted by lecturers of the Raymond Foundation staff. Below is the schedule that will be followed weekly in July and August:

Mondays: 11 A.M.—People and Places
2 P.M.—Highlights of the Exhibits

Tuesdays: 11 A.M.—The World of Plants
2 P.M.—Highlights of the Exhibits

Wednesdays: 11 A.M.— The Earth's Story
2 P.M.—Highlights of the Exhibits

Thursdays: 11 A.M. and 2 P.M.—Highlights of the Exhibits

Fridays: 11 A.M.—The Animal Kingdom
2 P.M.—Highlights of the Exhibits

Archaeology Lesson

To become an archaeologist in "one easy lesson" is an ambition not possible of fulfillment, but in one section of James Nelson and Anna Louise Raymond Hall (Hall 4) there are exhibits which demonstrate the rudiments of how "diggers" obtain knowledge of extinct cultures through excavation, classification, analysis, and interpretation.

JUNIOR MISS POSES ON MUSEUM STEPS

Miss Catharine Clyborne, age one year, a resident of Lemont, Illinois, was captured by the camera recently while she was descending the north steps of Chicago Natural History Museum. Miss Clyborne has been an enthusiastic visitor to the Museum frequently ever since she was 11 days old. She is the daughter of Mr. and Mrs. Harry V. Clyborne, both of whom are enrolled as Museum Contributors in recognition of their many notable gifts to the institution over a period of some years.

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Bulletin

Vol. 28 No. 9
September 1957

Chicago Natural History Museum

FOUNDED BY MARSHALL FIELD, 1893

Roosevelt Road and Lake Shore Drive, Chicago 5

TELEPHONE: WABASH 2-9410

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Members are requested to inform the Museum promptly of changes of address.

MEMBERS' NIGHT OMITTED

Traditionally, we have sought through Members' Night in October to acquaint Members and friends of the Museum with progress being made in the Museum program. In each instance, we have presented an outstanding new exhibition feature in connection with an open house.

Although productive work at the Museum has continued without diminishing throughout the year, it has been found advisable, in order not to interrupt our crowded work schedules, to postpone Members' Night until a more appropriate time. Our members will be informed through the BULLETIN of all special exhibitions and of the completion of important new exhibits as they occur.

In the meantime, until I can do it in person, I wish to thank our many Members for their interest and support.

CLIFFORD C. GREGG
Director

Daily Guide-Lectures

Free guide-lecture tours are offered daily except Sundays under the title "Highlights of the Exhibits." These tours are designed to give a general idea of the entire Museum and its scope of activities. They begin at 2 P.M. on Monday through Friday and at 2:30 P.M. on Saturday. There will be no tour on Monday, September 2 (Labor Day) but the Museum will be open to visitors.

Special tours on subjects within the range of the Museum exhibits are available Mondays through Fridays for parties of ten or more persons by advance request.

ANTHROPOLOGY LECTURES ON FRIDAY EVENINGS

"Visits with Peoples of the World," a series of lectures by distinguished anthropologists, will be presented in the James Simpson Theatre of the Museum on Friday evenings in October and November under the sponsorship of University College of the University of Chicago. Each lecture will be followed the next day by a field trip in the Museum to view exhibits correlated with the subject discussed. Two of the lecturers in the series are members of the staff of the Museum's Department of Anthropology; others are members of the faculties of the University of Chicago and Northwestern University. Visual aids (such as artifacts, films, and slides) and recordings to demonstrate tribal music and other sounds will be used by the lecturers. All are scientists who recently have been on expeditions in the areas of their specialization and have new data about the diverse peoples to be discussed.

All these lectures begin at 8 P.M. Following are the dates, subjects, and speakers:

October 18—Peoples of the Pacific. Roland W. Force, Curator of Oceanic Archaeology and Ethnology, Chicago Natural History Museum

October 25—Peoples of India: Peasants and Princes. Bernard S. Cohn, Assistant Professor of Anthropology, University of Chicago

November 1—Middle America: Descendants of the Maya. Sol Tax, Chairman, Department of Anthropology, University of Chicago

November 8—South America: Native Peoples and Their Culture. Donald Collier, Curator of South American Archaeology and Ethnology, Chicago Natural History Museum

November 15—The Peoples of West Africa. Warren d'Azevedo, Department of Anthropology, Northwestern University

November 22—The Negro and His Music in the New World. Alan P. Merriam, Professor of Anthropology, Northwestern University

Price of admission to single lectures is $1. Series ticket for all six lectures is $5. For students, single admissions are 75 cents and series tickets $4.

THIS MONTH'S COVER

Octopus at Home, detail of a painting by Staff Artist E. John Pfiffner, is typical of illustrative material supplementing specimens in the eight cases of the new exhibit, "The Animal Kingdom," to be opened this month in George M. Pullman Hall (Hall 13). Accounts of the scope and purpose of the new exhibit and of the many steps in its preparation are presented elsewhere in this issue by Dr. Austin L. Rand, Chief Curator of Zoology.

INSECTS IN PLASTIC TO BE EXHIBITED

Insects and flowers imbedded in plastic will be shown in a special exhibit in Albert W. Harris Hall (Hall 18) from September 1 through September 30. They were prepared by Julius J. Nagy, research chemist of Chicago, who makes a hobby of preparing insect specimens in natural attitudes and preserving them as decorative objects. The thirty-eight specimens to be displayed at the Museum, selected from several hundred that he has prepared over a period of fifteen years, are outstanding examples of a technique variously employed to preserve and to protect fragile objects for display or for handling in the classroom.

Mr. Nagy has tried, he says, to "improve on nature"—that is, to outdo in beauty insects fossilized in amber. It's an all-weather hobby, he says. "When the weather is good, I go out into the field and collect the insects and flowers. When the weather's bad, I stay indoors and prepare the specimens I've collected."

MUSEUM ACQUIRES 34,000 BEETLES

Outstanding collections of cetonid and lucanid beetles, totaling approximately 34,000 specimens, were received by Chicago Natural History Museum during August. The collections, which were acquired from an heir of the late Dr. Eduard Knirsch, a Viennese dentist (see Museum BULLETIN, February, 1956), represent years of work on the part of Dr. Knirsch, who was especially interested in these insects. The Museum's study collections of these beetles are now unparalleled in the museums of the western hemisphere.

The cetonids include some of the most beautiful as well as some of the largest of all insects. A special temporary exhibit of some of the more striking forms is being planned for display in October.

NEW EXHIBIT PROVIDES A KEY TO ANIMAL KINGDOM

By AUSTIN L. RAND
CHIEF CURATOR OF ZOOLOGY

A NEW EXHIBIT, "The Animal Kingdom," gives a bird's-eye view of what animals are like. Here the Museum visitor can see each group against a background of its relatives and get an outline of the whole animal kingdom. This display is located at the north end of George M. Pullman Hall (Hall 13) where most visitors begin their tours of zoology exhibits.

Not even a professional biologist can hope to know all of the million or so species of animals. To stress how vast the number of species is, we point out that a zoologist looking at them one species a minute would require 20 years of Museum working-time to check them all. If he made a list of them, typed 25 to the page, the stack of manuscript pages would be 10 feet high.

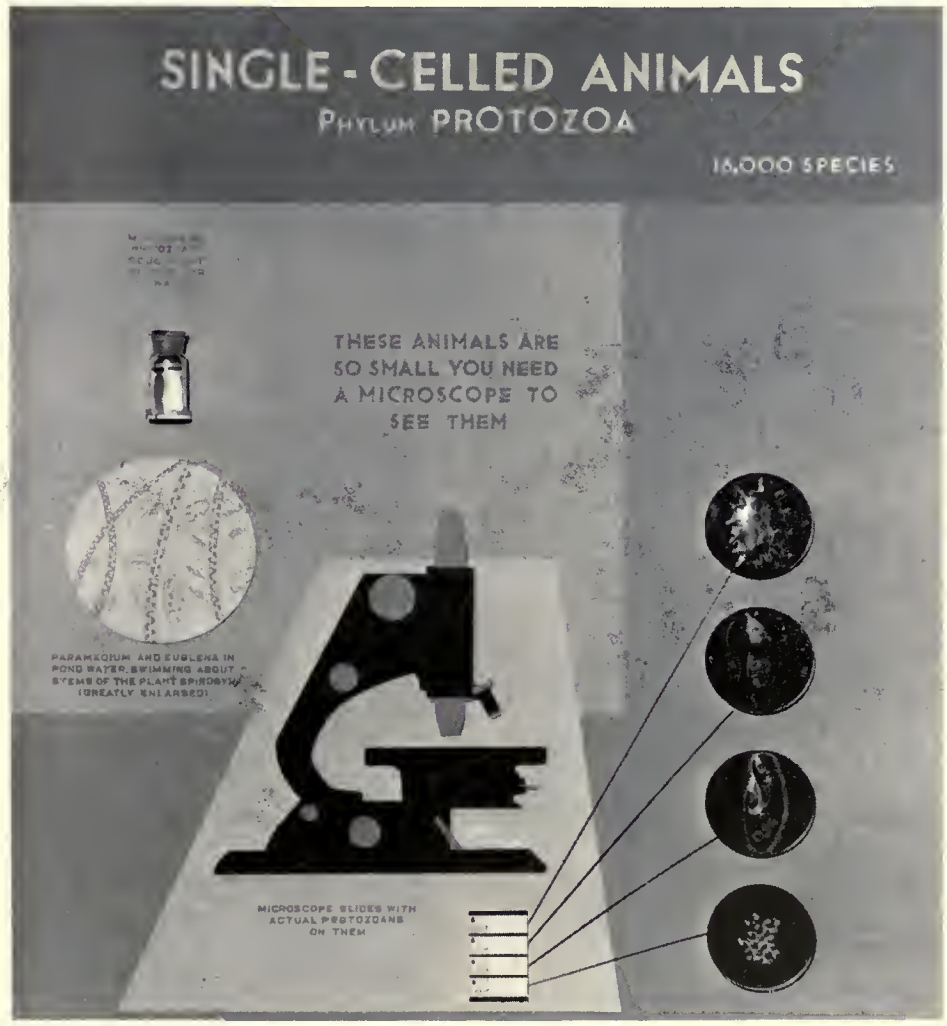
Despite the fact that we as human beings are animals—members of the animal kingdom and hence related to the other million or so known kinds of animals—our knowledge of these relatives of ours is scanty and erratic. Many of us have spent time and effort to find out about and even to visit our immediate relatives and to trace our ancestors. But I imagine few people have given much thought to the range and variety of the living animals that comprise our more distant relatives, not to speak of those that lived in the remote past and have left a record of fossils in the rock, a record that can be traced with some assurance back a half-billion years to the Cambrian period of the earth's history.

OUR COUSIN, THE AMOEBA

The single-celled amoeba of a pond, the horsehair worm of a rainbarrel, the tiny copepods of the ocean plankton, and the sea urchin of shallow seas may not seem very important, but measured as examples of the manifold forms into which animal life has been stamped, of the diversity of organization that has occurred in animal life, and the ramifications of the animal life of which we are a part, they assume a very real importance as our distant relatives. The discovery of the appearance and of the way of life of these our relatives can be among the adventures of everyday life.

As Museum visitors stand in front of our exhibit "The Animal Kingdom" and see examples of the eight major types of animals, we hope they will be impressed enough by this outline of what the living world holds to spur them to want to find out more about these, our relatives—what they are and their way of life.

While the multiplicity of kinds of animals precludes any one person from knowing them all, many of the species differ only in detail. There are groups of similar species that we put together under generic names, genera that we group into families, families into orders, orders into classes, and classes into phyla. These groupings not only indicate relationships but are also an aid to memory.


SINGLE-CELLED ANIMALS
PHYLUM PROTOZOA
16,000 SPECIES
THESE ANIMALS ARE SO SMALL YOU NEED A MICROSCOPE TO SEE THEM
PARAMECIUM AND EUGLENA IN POND WATER, SWIMMING ABOUT STEMS OF THE PLANT SPIRODYRA (GREATLY ENLARGED)
MICROSCOPE SLIDES WITH ACTUAL PROTOZOANS ON THEM

THE PROTOZOANS—FIRST OF THE ANIMAL KINGDOM EXHIBITS

These are the simplest animal forms. In the Museum display they are represented, greatly enlarged, by reverse carvings. Actual specimens can be seen only with a microscope. Millions could exist in jar of water.

EIGHT MAJOR TYPES

A knowledge of animals should include at least an acquaintance with the main types of animals. There are eight of these major types of animal organization, or structure, that are prominent parts of the animal life of the globe. In our new exhibit, examples of each are presented in eight cases placed side by side in an alcove so that a visitor, standing in one place, can see what these eight types look like.

These main types are:

1. Single-celled animals, or protozoans, of which the microscopic amoeba and paramecium of elementary biology classes are examples.

2. Sponges—many-celled animals of simple organization. The common bath sponge is the best-known example of these (the sponge of commerce is only the skeleton of the animal from which the fleshy parts have been cleaned).

3. Jellyfish, corals, and the like, grouped under the name coelenterates—with a sac-like digestive system, a radial symmetry (like that of a wheel), and stinging cells—stand near the basic stem to which the higher phyla seem related.

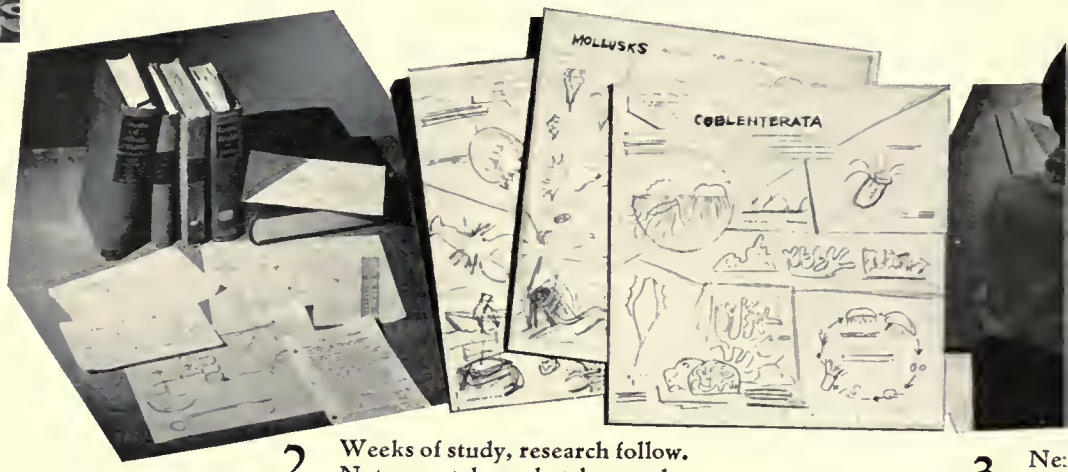
4. Worm-like animals. This is a heterogeneous grouping, for inside the worm-like form of such types as flat worms, round worms, and earthworms is considerable difference in structure—they have bilateral symmetry (a left and right side), and their organ systems are better developed than in the previous groups. In earthworms, segmentation is introduced (shown by the rings of an earthworm). Various minor groups, such as ribbon worms, horsehair

(*Continued on page 7, column 1*)

Into the preparation of a new exhibit, such as "The A
go many weeks of planning, research and creative effort
the picture-story from inception to completion of th

AN EXHIBI

1. Plans are outlined by Chief Curator Rand and Staff Artist Pfiffner (left).



2. Weeks of study, research follow. Notes are taken, sketches made.

3. Ne
of

7.

axidermists
nd artists
eet to inte-
rate efforts.

8. Artist Krstolich installs king crab—carves jellyfish cycle in plastic—places small octopus on screen.

9. Taxidermists Lambert (left) and Cotton p
specimens for case of backboned animals.

Amal Kingdom" which will be opened in September, t the part of staff members of varied talents. Here is new exhibit in George M. Pullman Hall (Hall 13).

IS BORN

drawings are made new cases.

4. Artist Marion Pahl begins color layout.

Dr. Haas (left) and Dr. Rand select the specimens. 5.

6. Artist Pfiffner works on one of eight paintings in exhibit.

10. Cases are installed, readied for the public.

11. Complete except for labels, "The Animal Kingdom" is appraised by Dr. Ra and John R. Millar, Deputy Director of the Museum.

THE STORY BEHIND A MAJOR MUSEUM PROJECT

By AUSTIN L. RAND
CHIEF CURATOR OF ZOOLOGY

WHEN WE PLANNED the synoptic exhibit of the animal kingdom one of the first questions was how big to make it. Obviously we couldn't use many whales, cuttlefish, elephants, or giant clams. But we could use small examples instead of large ones of each of the eight major types of animals. Finally we planned an exhibit that could be seen in its entirety in one place. After all, we have whole halls devoted to only parts of one group, for example five halls for mammals, which are merely one subgroup of the vertebrates. Vertebrates themselves have only about 46,000 species (contrasted with the million or so animals there are). For further information about each group we refer the visitor to the appropriate hall.

For the new exhibit we use eight cases, side by side, one for each of the major types of animals, and use small examples of each group shown. A mouse, a thrush, a perch, and a lamprey represent the vertebrates just as truly as would an elephant, a condor, a sturgeon, and a manta ray.

We want the Museum visitor, on first sight of the exhibit, to say "How attractive! How interesting looking! I wonder what it shows!" even before he becomes aware of the entrancing story the exhibit tells. A conference of Museum artists came up with background designs, dividing the cases into panels for each subgroup to be shown, and pastel shades of brown and tan were chosen to paint the panels.

PAINTINGS ADD INTEREST

We realized early that the actual specimens we could exhibit needed additional illustrative material to show where and how the animals lived and their importance on our globe—something that would put across the beauty, the prominence, and the interest to us of these animals. A painting seemed the answer, and in each case we put at least one such panel. In subject the paintings range widely: for instance one is a robin pulling up a worm on a lawn, another an enlargement of protozoans in a drop of water, and another a view of corals on the Australian Great Barrier Reef. As well as supplementing the more prosaic specimens, the pictures are attractive in themselves, adding brightness and color.

Some of the specimens were easy. Dried sponges and corals (of the coelenterates) were used, even though they were only poor dried skeletons. Insects and crabs (arthropods) with their hard exoskeletons were fairly easy, though the legs of spiders and centipedes presented special difficulties. Snails and clams (mollusks) are represented chiefly by their shells, and echinoderms have a skeleton that is near enough to the surface to hold the shape when dry.

Most of the vertebrates require special preparation. We have one taxidermist whose specialty is making lifelike mounts of birds and mammals, and another who specializes in plastic replicas of reptiles, amphibians, and fishes that compare well with their living prototypes.

OBSTACLES ARE OVERCOME

Then came the difficulties: soft-bodied worms, jellyfish that were mostly water, transparent crustaceans such as copepods. Fortunately we had some glass models, made long ago, of jellyfish, sea anemones, and Portuguese man-o'-war. These models would be hard to duplicate at the present time. The complexity and the transparency of these animals, and the long delicate tentacles are extremely difficult to show in any preparations, but the models we have are fine examples of the glassblower's skill. A few other models were made, such as that of the octopus modeled in wax with arms stiffened with wire.

However we used models as sparingly as possible. We wanted to show the real specimens whenever possible. Conferring with Turtox (General Biological Supply House) personnel we found that a number of soft-bodied animals could be displayed by first embedding them in a clear plastic. Some lower chordates, some crustaceans such as fairy shrimp, and a number of worms were prepared by Turtox in plastic blocks of appropriate sizes and show the animals very well. Even a dried sea-lily (crinoid) was improved in appearance by being embedded in a block of clear plastic.

Yet another technique was used in presenting an outline of the life history of a jellyfish. The animals are delicate and transparent at every stage, and a reverse carving was the answer. The animals were engraved on the back of a sheet of clear plastic, a small grinding-tool being used. When viewed from the front against a dark background, it is like looking at real animals floating in water. A similar technique gave very effective representations of copepods and an arrow worm. Not only are these transparent animals better represented than they would be by models, but the reverse carving is a much quicker process and it gives a "specimen" that is much more durable than a model would be.

MICROSCOPIC SPECIES ENLARGED

Most of the animals shown are actual animals and most of the models are natural size, even when small species are shown. But when we came to the protozoans we had to show enlargements. We put samples of the real protozoans in the exhibit, mounted on microscope slides, but you can't even see them under the cover glass. So we also made enlargements by the reverse-carving method. To give the proper depth in the carving, some details were carved on a second sheet of plastic and placed back of the first. These carvings are displayed on dark backing. From the front the appearance of depth is very real. To emphasize the fact that these are enlargements we placed a cutout of a microscope in the middle of the exhibit showing the protozoans. This points up the fact that protozoans are microscopic and that when you look at them you must use a microscope.

This is some of the background of "The Animal Kingdom." There is more that hasn't been touched on: the study collections gathered over the years on which we could draw for specimens, the books and the research that went into the form of the presentation, the long periods of application of rare skills of several persons to put the material together. The preparations required more than a year of work. Now, standing in front of the exhibit, you can see at a glance a synopsis of the types of animals that exist.

The exhibit was planned in the Department of Zoology. Joseph B. Krstolich, departmental Artist, devoted his time to it for over a year. E. John Pfiffner, Staff Artist, did the basic design of the exhibit unit and also the paintings and diagrams, with assistance by Miss Marion Pahl, Staff Illustrator. Carl W. Cotton, Taxidermist, prepared the birds and mammals, and Ronald Lambert, Taxidermist, did the reptiles, amphibians, and fishes. General Biological Supply House (Turtox), of Chicago, co-operated with the Museum in preparing and supplying material embedded in plastic.

CURATOR TO COLLECT CARIBBEAN FISHES

As on several occasions in past years, the Museum will participate in a fishing expedition of the United States Fish and Wildlife Service. By invitation, Loren P. Woods, Curator of Fishes, sailed August 13 from Pascagoula, Mississippi, aboard the government service's motor vessel *Oregon* for a cruise of about forty days offshore, outside the international 12-mile limit. Trawling and long-line fishing along the entire coast of Central America from Yucatan to Panama will occupy the ship's regular crew and Curator Woods.

While the ship's personnel is engaged in investigating problems relating to commercial fisheries, Woods hopes to obtain thousands of specimens for study and for exhibition at the Museum. Woods will return to Chicago with his collections late in September, with barely enough time to sort his specimens into jars of alcohol before he departs again on the *Oregon* in November for a similar 40-day expedition farther south along the Atlantic coast of the Guianas and Brazil.

KEY TO THE ANIMAL KINGDOM IN NEW EXHIBIT

(*Continued from page 3*)

worms, spiny-headed worms, arrow worms, lamp shells, and moss animals, are briefly introduced here.

5. Arthropods. The best known in this phylum are the insects, the spiders, and the crayfish and lobsters. Jointed legs, an exoskeleton, and an elaborated segmentation characterize this highly evolved group.

6. Mollusks. The clams with a shell in two parts, the snails with one-piece shell, and the squids and cuttlefish with no obvious shell are the best-known types.

7. Echinoderms. The sea urchins, starfish, and sea lilies are characteristic of this phylum, which has a radial symmetry (like that of a wheel).

8. Vertebrates. From fish to man these are the familiar larger animals. The backbone, bilateral symmetry, and the presence of two pairs of limbs (usually) are typical.

The last four of these—the arthropods, mollusks, echinoderms, and vertebrates—are all very advanced phyla characterized by highly organized animals, each group specializing in a different way. The single-celled animals and the related phylum sponges are the simplest. The basic structure which could have given rise to the higher vertebrates is seen in the coelenterates.

This exhibit, "The Animal Kingdom," also serves as an index to the zoology exhibits in the Museum. Under each group we indicate the halls in which animals of each type can be found.

THE BACKBONED ANIMALS

This group embraces the most highly evolved animals. They live in water, on land, and in the air. They include, in addition to the familiar vertebrates, the little-known lower chordates. The exhibit is the last in the series of eight summarizing the Animal Kingdom.

Some of the most ancient examples of cultivated grains—ancient barley and wheat from Mesopotamia, of wheat from the pyramids of Egypt, and corn from the pre-Colombian Indian sites in North and South America—are exhibited in the Hall of Food Plants (Hall 25).

'JOURNEY' FOR CHILDREN TO INDIAN COUNTRY

The Museum Journey for boys and girls this autumn is "Exploring Indian Country." It will be available to any child at any time on every day in October and November. Children who wish to participate should ask for Journey sheets at either the North or South entrance of the Museum. These instructions direct the "travelers" to the Indian exhibits in Hall 5 (Mary D. Sturges Hall) and Hall 6, where they will find material to stir their imaginations for travel by canoe, snowshoes, and horseback and for living as the Indians did 150 years ago in the Chicago area and in the West.

During the Journey the child fills in questions on his Journey sheet and deposits it in a box at either Museum door when he leaves the building. When the child has successfully completed four Journeys he receives an award as a Museum Traveler. After eight Journeys he becomes a Museum Adventurer and after twelve a Museum Explorer.

The fall Journey is correlated with the season's series of Museum Stories, "Indian Neighbors of Our United States Settlers," which was written by Miss Harriet Smith of the Raymond Foundation staff, who also arranged the Journey. One story in this series will be given to each boy and girl at each Saturday-morning movie in the Museum's James Simpson Theatre during October and November. All nine stories will be available as a set after November 30 at the Museum Book Shop.

NEW MEMBERS

The following new Members were elected in the period from July 15 to August 15:

Sustaining Members

Mrs. Stanton Armour, Sr., Paul J. Basinger

Annual Members

Charles G. Ashbrook, Mrs. Harry Bairstow, Jr., Milton B. Beach, George H. Bunge, Anson W. Cameron, Jack Carl, David R. Coey, James R. Cruttenden, William H. Depperman, Charles Dunlop, Theodore T. Eckert, Howard F. Erzinger, Stephen D. Faber, Harry L. Gadau, Stanley H. Garrod, S. F. Greenlaw, Edward E. Hallihan, Burton W. Hales, Jr., Thomas A. Harwood, Leonard H. Hirsch, Harry Holubow, William R. Hunt, Sidney Hutchings, M. H. Joffe, Dr. Charles H. Ketteman, Ben D. Kissel, William G. Knapp, Dr. John R. Laadt, Raymond P. Lowrie, F. C. MacKrell, Cleo Edwin McPherson, L. E. Meyer, S. E. Meyers, William B. Miller, Jr., Howard C. Morton, Arthur K. Oldin, Charles R. Perrigo, Dr. David T. Petty, Jonathan Pugh, Carl Renner, C. Snelling Robinson, Joseph A. Saccone, Jr., Archie M. Schrom, Ben E. Schwartz, Frederick H. Sommer, Dr. Natalie Stephens, Robert D. Stuart, Jr., Dr. Ernest H. Wakefield

For Children . . .

DANCES OF INDIANS AND FREE MOVIES

Children's free entertainments in the Museum this autumn will open October 5 with a program of Indian dances and stories presented by Reginald and Gladys Laubin, well known for their work in this field. The other eight programs will be motion pictures.

These programs are provided by the James Nelson and Anna Louise Raymond Foundation. There will be a show each Saturday morning during October and November in the James Simpson Theatre of the Museum at 10:30 o'clock. No tickets are needed. Children are invited to come alone, accompanied by parents or other adults, or in groups from schools, clubs, and other centers.

In addition to the Indian-dance program on **October 5**, the programs in October will be:

October 12—Columbus Day Special
Story of Christopher Columbus
Gold Rush Boy
Also a cartoon

October 19—Alice in Wonderland
(Walt Disney's version)

October 26—The Phantom Horse
Family life on a modern horse-farm in Japan

GEOLOGY PROGRAMS FOR BOY SCOUTS

A special series of programs on geology for Boy Scouts has been arranged at the Museum for Saturday mornings in October in co-operation with the Chicago Council of Boy Scouts. Titled "The Greatest Show on Earth," the programs are designed to stimulate interest in the earth sciences and to promote follow-up activities at troop and patrol meetings.

Scouts will come to the Museum in groups accompanied by scoutmasters or other adults. Each boy will receive a set of question-sheets and be given ample time in exhibition halls to find the answers. Before embarking on these expeditions, the groups will meet with a member of the Raymond Foundation staff for orientation and directions. These meetings will be at 10 and 11 A.M. Groups planning to participate must have reservations made by their scoutmasters at least two weeks in advance.

Change in Visiting Hours

On September 3, the day after Labor Day, the autumn schedule of visiting hours, 9 A.M. to 5 P.M., will go into effect at the Museum.

STAFF NOTES

Dr. Clifford C. Gregg, Director, has been appointed a member of the National Committee of Sponsors of the Theodore Roosevelt Centennial observance. The centennial begins October 27, 1957 (birthday of the former President, who died in 1919) with the dedication of a memorial island in New York and extends to October 27, 1958, the 100th anniversary of Theodore Roosevelt's birth . . . . **Rupert L. Wenzel**, Curator of Insects, spoke on "Insects of the Chicago Area" on Northwestern University's "Live and Learn" television program (WNBQ) on August 18 . . . . Radio Station WSEL-FM featured three Museum staff members on a recent program: **E. Leland Webber**, Executive Assistant, **Miss Miriam Wood**, Chief, Raymond Foundation, and **Henry S. Dybas**, Associate Curator of Insects. Miss Deane Carroll of the station staff interviewed them on various aspects of the Museum's activities.

AUDUBON LECTURERS TO BEGIN SEASON

A series of five free lectures, illustrated with color motion-pictures, will be presented in the James Simpson Theatre of the Museum during the fall, winter, and spring under the auspices of the Illinois Audubon Society. The first, on Sunday afternoon, October 20, at 2:30 o'clock, will be "The Faraway Falklands" by Olin Sewall Pettingill, Jr.

The other lectures, which also will be on Sunday afternoons at the same hour, are: November 10, "Wanderland," William H. Wagoner, Jr.; January 12, "Puerto Rico, U.S.A.," Fran William Hall; February 23, "High Horizons," William Ferguson; and March 16, "Forgotten Country," Bert Harwell.

Seats in the reserved section of the Theatre are available to Members of the Museum as well as Members of the Audubon Society on presentation of membership card of either organization.

National Science Foundation Aids Meteorite Research

A research project on meteorites will get under way early this month with the departure for Europe of Dr. Sharat K. Roy, Chief Curator of Geology. The work is sponsored jointly by the National Science Foundation, which made a grant for the purpose, and the Museum. Dr. Roy will first study meteorite collections in London, after which he will make a survey of similar collections in Paris, Frankfort, Vienna, Helsinki, Moscow, and other European centers. He will then proceed to Calcutta, where he will carry on his project at the Indian Museum.

Saturday Afternoons . . .

LECTURES FOR ADULTS BEGIN OCTOBER 5

The autumn series of free illustrated lectures for adults on Saturday afternoons will begin October 5 and continue on each of the nine Saturdays through November 30. This is the 108th series to be presented by the Museum under the provisions of the Edward E. Ayer Lecture Foundation Fund.

A variation from the usual type of lecture will be offered on the opening program, which will be a dance recital in which the spoken word will be subordinated to dance presentations. The performers are Reginald and Gladys Laubin, who are noted for their authentic and graceful interpretation of American Indian dances.

The October programs are:

October 5—Indian Dances
The Laubins

October 12—Alberta
Dick Bird

October 19—Beneath the Seas of Ceylon
Mike Wilson

October 26—Argentina
Eric Pavel

A complete schedule of the lectures will appear in the October BULLETIN. All of the programs will be given in the James Simpson Theatre of the Museum at 2:30 P.M. Except for the dance recital, the programs will be illustrated with color motion-pictures. A section of the Theatre is reserved for Members of the Museum, and each Member is entitled to two reserved seats for each program. Requests should be made in advance by telephone (WAbash 2-9410) or by mail. Seats will be held in the Member's name until 2:25 P.M. on the day of the program.

GIFTS TO THE MUSEUM

Following is a list of the principal gifts received during the past month:

Department of Anthropology:
From: Mrs. W. C. Bentley, Chicago (in memory of Julia Pines Teller)—silk embroidered gown, China

Department of Botany:
From: Dr. Henry Field, Coconut Grove, Fla.—7 economic specimens, West Pakistan; Eli Lilly and Co., Indianapolis—*Nardostachys jatamansi*, Asia; Oklahoma A. & M. College, Stillwater, Okla.—*Xanthocopalum gymnospermoides*, Mexico

Department of Geology:
From: Dr. Glenn T. Gough, Topeka, Kan.—celestite specimens; Glen Speight, West Branch, Iowa—specimen of Goniophyllum

Department of Zoology:
From: Dr. Richard M. Bohart, Davis, Calif.—63 mosquitoes, Micronesia and Ryukyu Islands; University of California, Los Angeles—1,064 fishes

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Bulletin

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THE BULLETIN

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Members are requested to inform the Museum promptly of changes of address.

GEORGE A. RICHARDSON RESIGNS AS TRUSTEE

At the September meeting of the Board of Trustees the resignation of George A. Richardson as a Trustee was accepted with deep regret and with an expression of gratitude for his long and faithful services in behalf of the Museum.

Mr. Richardson was elected to the Board in January, 1930, and had served as a member and as chairman of the Museum Auditing Committee during most of his tenure. His resignation was presented because of his residence at Rancho Santa Fe, California, and the termination of business connections which have, in recent years, caused him to spend much of his time in Chicago.

CHILDREN'S ACTIVITIES DURING AUTUMN

In addition to the free Saturday-morning movies announced elsewhere in this BULLETIN, various other special activities for children will be offered at the Museum in October and November. "Exploring Indian Country," one of the series of Museum Journeys for boys and girls, may be taken by any child on any day and at any hour between 9 A.M. and 4 P.M. throughout the two months. To participate, children need only to request a Journey instruction-sheet at either entrance of the Museum and follow the "travel" directions. With the aid of the Museum exhibits listed, the children can make an imaginary journey through the homelands of the Indians of the Chicago area and of the old West. The child who fills in the questions on his Journey sheet and deposits it in a box at either Museum entrance receives credit. When children have completed four different Journeys successfully, they receive awards as Museum Travelers. After eight Journeys they become Museum Adventurers, and after twelve Journeys they are Museum Explorers.

During October only, a special series of programs on geology will be given for Boy Scouts. The programs, entitled "The Greatest Show on Earth," are designed to stimulate interest in the science of the earth that will lead Scout troops into field trips and other follow-up activities. Groups wishing to participate must make advance reservations. Meetings will be held at the Museum each Saturday morning in October at 10 and 11 o'clock.

During October and November an "Expedition to Indian Country" will be offered on Saturdays for Camp Fire Girls after they have seen the Saturday-morning motion picture for children in the James Simpson Theatre.

All children's activities are conducted by the Raymond Foundation. By advance arrangement, teachers may bring their classes for special tours. For 5th, 6th, 7th, and 8th grade pupils, the Foundation offers study-unit projects in October and November on "Trees and Their Uses," "Indians of the Woodlands and Plains," "Tracing the Developmental Ages of the Earth," "Ancient Egypt," "China—The Land and the People," "Getting Acquainted with Our Geological Resources," and "Investigating the Geological Nature of the Chicago Region." Participation programs for lower-grade pupils during the same period include "Learning about Insects" (for 4th grade only) and "How Living Things Survive Weather Changes" (for first to fourth grades). Advance reservations by teachers are required for these programs.

Beautiful and Bizarre Beetles in Exhibit

Spectacularly beautiful and bizarre specimens of stag and scarab beetles, selected from the Museum's recently acquired collection of some 34,000 assembled by the late Dr. Eduard Knirsch, of Vienna, will be shown in a special exhibit in Stanley Field Hall throughout October.

Many of the species of beetles displayed are actually gemlike in appearance. Others are notable for their size, which places them among the largest of all insects.

THIS MONTH'S COVER

Few people would dispute the statement, if made, that our cover picture is a photograph of an actual volcano. The fact, however, is that it shows a miniature volcano in a diorama in the Museum (Hall 34, Physical Geology). It was chosen as an appropriate illustration for the article on volcanoes by Dr. Sharat Kumar Roy, Chief Curator of Geology, which appears on page 3. Special color and lighting effects in the diorama give the illusion of active eruption.

MUSEUM BIDS FAREWELL TO CAPTAIN OF GUARD

Frank Meinke, Captain of the Guard at the Museum, resigned as of September 15 to begin his "second retirement." Before coming to the Museum service in 1948, Mr. Meinke had been retired on pension by the West Towns Bus Company, in whose employ he had served for 29 years. At the Museum he quickly made a reputation for unfailing courtesy and attentiveness to the needs of the visiting public and for the friendliest of relations with members of the institution's staff. He was promoted to Sergeant of the Guard in 1952 and to Captain in 1956. In retirement he plans to continue living in Maywood, Illinois, his home for many years. He takes with him the wishes of the Museum personnel for many enjoyable years.

Frank Meinke

BOOK ON PREHISTORIC MAN REPUBLISHED BY MUSEUM

A third and greatly enlarged edition of *Prehistoric Men*, one of the Museum's popular series in anthropology written by Dr. Robert J. Braidwood, Research Associate in Old World Prehistory, and published by the Museum in co-operation with the Oriental Institute and the University of Chicago, is now on sale in the Museum Book Shop. The price is $1.25 (mail orders are accepted).

Dr. Braidwood's highly successful book has been increased in size by one-half with the addition of new text, drawings, and charts. The story of prehistoric men is told in highly readable style by Dr. Braidwood, who is a member of the staffs of the Oriental Institute and University of Chicago.

GEOLOGIST REPORTS ON VOLCANOES IN CENTRAL AMERICA

By SHARAT KUMAR ROY
CHIEF CURATOR OF GEOLOGY

Dr. Roy has specialized in volcanic studies for years and has made several expeditions to volcanoes for the Museum. His most recent investigations, conducted this past summer, took him to active volcanoes in Mexico, Guatemala, El Salvador, Nicaragua, and Costa Rica.

THE VOLCANIC BELT of Central America, which extends from Guatemala in the northwest through the republics of El Salvador and Nicaragua to Costa Rica in the southeast, is only a small part of the great belt of volcanoes that encircles the Pacific Ocean, familiarly known as the circum-Pacific girdle of fire. Though a small part of the whole, the Central American volcanic region is one of the most important on earth. In throwing up explosive material per unit area, it ranks first, East Indies second, and the Alaska-Aleutian chain third.

VOLCANOLOGIST IN FIELD
Dr. Sharat K. Roy, Chief Curator of Geology, in El Salvador during his most recent expedition.

Between Volcán Tacaná near the Mexican border of Guatemala and Volcán Turrialba in Costa Rica there are some twenty volcanoes of first magnitude, not only from the standpoint of volcanology and output of explosive material but also from that of physical beauty and grandeur. Be they naked like Izalco in El Salvador and Momotombo in Nicaragua or fully clothed in lush vegetation like Agua in Guatemala and the twin-peaked San Vicente in El Salvador, they have few rivals.

SOIL IS ENRICHED

Volcanic soil is rich in plant-food. Once lava is decomposed into soil it becomes highly productive and provides nourishment for luxuriant growth for years without refertilization. Central America owes the main support of its economy, namely coffee, to its volcanic soil. Here nature's law of compensation comes into play. The disastrous consequences that volcanic eruptions frequently entail—destroying entire cities and burying acres and acres of thriving farm lands with lava and ash—are amply compensated for by the good that volcanoes bestow in equal frequency upon man and his surroundings.

Out of the ruins spring new cities with earthquake-proof structures; farm lands seemingly destroyed are replenished by fresh fertilizers from deep in the earth, free of charge. Fumaroles and boiling springs, which emanate superheated steam and other gases even long after a volcano has ceased to be active, contribute to the welfare of mankind by yielding large supplies of steam for power generation, as they have in the volcanic regions of Italy, Iceland, and New Zealand. Power possibilities of the fumarole fields of Central America are now being investigated. These fields, which have been none too kind to me, personally,* may yet add to the economy of that country something besides coffee.

HIGHLY EXPLOSIVE

Central American volcanoes, by far and large, are of the "intermediate type"—that is, they are intermediate between cinder cones, which are made wholly of fragmental ejecta resulting from explosive eruptions, and shield volcanoes built entirely of quiet lava flows. Their eruptive behavior is Strombolian—that is, like the volcano Stromboli in the Lapari Islands north of Sicily, they are highly explosive, discharging gases and throwing up huge quantities of bombs, lapili, and ashes, darkening the sky in daytime or lightening it at night. Except during a great eruption, such as the one of Izalco in El Salvador early in 1956 when the summit of the cone was blown off and the crater wall was breached, seldom does lava well out of a crater. Lava flows of the intermediate volcanoes are restricted to breaks in the flanks of volcanoes or to fissure eruptions at their bases.

As yet no long-range forecasting of a volcanic eruption can be made. Premonitory tremors around and adjacent to a volcano may be regarded as a sign of impending danger, and when they occur preparation for evacuation should be expedited by inhabitants of the area—it is foolish to sit back and be victims of a "what is to be will be" fatalism. The eruptions of Central American volcanoes have not followed a set pattern—that is, they have not been cyclic. On the contrary, they have been highly erratic. The prerequisite of cyclic recurrences is an orderly movement of magma and reactions within it. The variable factors involved in the mechanics of volcanism would, it seems, impede rather than facilitate the storing and releasing of energy and material in rythmical regularity.

CRATERS AT SUMMIT

Practically every major volcano of Central America has a summit crater. The larger craters, some of which are six to eight kilometers in circumference and 100 to 200 meters deep, are invariably nested (as many as four, one forming within the other) either concentrically or eccentrically.

NATURE'S FIREWORKS
Night scene during eruption of Volcan Izalco in El Salvador—Central America's most active volcano.

There is a direct relationship between volcanism and earthquakes in volcanic regions. Volcanism refers both to underground shifting of magmas and to surface manifestation of the turbulent interior in the form of a volcanic cone. Some geologists tend to minimize the significance of the former process and cling to the notion that a "volcanic earthquake" is of shallow focus and therefore is of no consequence, while holding that all great earthquakes are tectonic (due to structural fault movement). My experience with the Central American volcanoes and my field studies of the great Jacuapa-Chinimeca earthquake of 1952 in El Salvador have left me with no alternative but to concur unqualifiedly with the late eminent volcanologist, Thomas A. Jagger, who contended that "great earthquakes may be occasioned by magmatic shifts beneath the earth crust, and even the great fault movements may be effects rather than causes."

*Dr. Roy has twice suffered badly burned feet in accidents while investigating the hot craters of active volcanoes.

A TO Z (AZORES TO ZANZIBAR) IN FALL LECTURE SERIES

CEYLON, Zanzibar, the Caribbean, Madeira, and the Azores—the very names breathe a promise of adventure and rare delights. These are some of the places you are invited to visit, without a penny of cost, by attending the autumn lectures (illustrated with color motion-pictures) on Saturday afternoons in October and November in the James Simpson Theatre of the Museum. The series is the 108th offered under the provisions of the Edward E. Ayer Lecture Foundation Fund.

The opening program, on October 5, will be a dance recital demonstrating the terpsichorean art of the American Indians. All nine programs will begin at 2:30 P.M. Each Member of the Museum is entitled to two seats in the reserved section of the Theatre. Following are dates and subjects:

October 5—American Indian Dances

The Laubins

Reginald and Gladys Laubin have lived among Indian tribes for years. They are famed today as the dancers who interpret the lore of the old days more eloquently than today's Indians themselves can do it—an opinion in which many Indians concur. Not only as ethnic dancers but as artists whose choreography is on a plane with the best of ballet, the Laubins have won the acclaim of leading critics throughout America and Europe. The ceremonial *pas de deux* they present range from the stately Chief's Dance and the spectacular Hoop Dance to the comical Prairie Chicken Dance and the exciting Dance of Discovery.

October 12—Alberta

Dick Bird

One of the Museum's greatest attractions in recent years is the giant dinosaur Gorgosaurus that towers over the center of Stanley Field Hall. In color films and narrative, Dick Bird will take his audience right into Canada's Valley of the Dinosaurs, whence came the skeleton of Gorgosaurus and more than a hundred other prehistoric creatures of the Age of Reptiles. The motion pictures show also many other marvels of the Province of Alberta—more than 70 snowcapped peaks, glaciers, jewel-like lakes, and a vast array of wildlife including bears, moose, elk, and mountain goats.

October 19—Beneath the Seas of Ceylon

Mike Wilson

Through the magic of superb underwater photography, our armchair explorers will be taken into eerie coral-lined caverns and weird grottoes on the floor of the sea on the coast of the island known as the "Pearl of the Orient." Swimming along with giant fishes they will invade through gaping hatches the wrecks of ships that came to grief on Ceylon's reefs. They will discover with Wilson the scattered ruins of an ancient Hindu temple 2,000 years old and one of the richest in the Orient, which was looted and tossed into the sea stone by stone by vandalous enemies three centuries ago. But Wilson's films are not all submarine—he shows also the natural and man-made beauty-spots ashore on Ceylon.

HINDU TEMPLE

Scene in Port-of-Spain, Trinidad, from film "Islands of the Caribbean" by Nicol Smith, who will lecture in the James Simpson Theatre on November 16.

October 26—Argentina

Eric Pavel

The story of the changes that have occurred in Argentina since the end of the Peron regime is presented in the lecture and color-films offered by Eric Pavel. He begins with the life of the people of Buenos Aires, largest and most cosmopolitan city of South America. Thence he takes his audience to the cattle ranches of the pampa, to the sheep ranches of Patagonia, and high into the majestic Andes. Other features of his motion pictures are the seashore resort at Mar del Plata, the maté plantations where the native tea is grown, the spectacular Iguacu waterfalls, and the picturesque gaucho parades and regional dances of the people.

November 2—South from Zanzibar

Clifford Kamen

Starting in the small independent island sultanate of Zanzibar, once a major slave-trade center, Clifford Kamen takes his listeners to Bechuanaland where through his color films they find themselves confronted by charging elephants and fleeting herds of zebras, sable antelopes, and giraffes. Thence he proceeds to the Rhodesias, interesting both for their remains of an ancient native African civilization and the development from a wilderness into a modern mining center. Then a visit is made to Zululand with its warlike tribes, where he shows hundreds of native dancers in the spectacle of a Zulu wedding ceremony. Victoria Falls, twice as high as Niagara, provides an imposing feature.

November 9—Yucatan

James Metcalf

The mood, the mystery, and the glowing colors of Yucatan, seat of one of the oldest civilizations in the western hemisphere, are captured in the color-films of James Metcalf. He begins his pictures and narrative with Merida, "the White City" and capital of the state. Then on palm-fringed beaches along the coasts he introduces the audience to many weird birds and fishes. A large part of the film and lecture is devoted to the modern Mayas, descendants of the founders of the ancient civilization. Visits are made to the fabulous ruins of Chichen Itza, Uxmal, Kabah, Labna, and Tulum. At Chichen Itza the film is climaxed by a re-enactment of the sacrifice of a maiden hurled into the sacred well of the rain god during a colorful ritual performed by a large troupe of Mayas in picturesque costumes of the past.

November 16—Islands of the Caribbean

Nicol Smith

Vagabonding through the Caribbean on a small yacht, Nicol Smith and his camera record the wonders of island after island. First a visit is paid to luxuriant Jamaica, with its melting pot of minority groups from many Oriental countries. Thence Smith proceeds to Trinidad, another mecca of peoples from the East. Here, in its birthplace, he records genuine calypso music and dancing. An outstanding experience is a trip to the submarine coral garden of Bucco Reef in Tobago, with an intimate peek into the life of mollusks, crustaceans, and fishes. Calls are made also at Bird of Paradise Island, Barbados, Grenada, Dominica, and Antigua, each providing beautiful scenic vistas, interesting animal and plant life, and picturesque peoples.

November 23—Adventures with Camera and Spear

Sasha Siemel

Well-known for unusual adventures and for his dramatic talent in reporting them is Sasha Siemel, world traveler and lecturer who has appeared frequently before at the Museum. His new color-films and narrative are the result of recent world-wide roaming in quest of new thrills. They range from Greenland and Labrador to the West Indies in hurricane time and to his favorite hunting-ground, the Matto Grosso jungle of Brazil. He climaxes his adventures in single-handed

spear fights with jaguars. He has conquered 261 of these killers in lone combat.

November 30—Portugal, Madeira, and the Azores

Karl Robinson

Some of the world's most enchanting and least known garden spots are to be found in Portugal and her island possessions. Less traveled by tourists than most of the European countries, Portugal is rich in history and tradition that are brought to life in Karl Robinson's color motion-pictures of the beautiful and sophisticated river-city of Lisbon. Robinson takes his audience also to Estoril and Cintra, wonderlands of palaces, forests, and expansive views. Madeira and the Azores, peaceful and unspoiled hideaways in the ocean, are rediscovered in his films.

RESERVED SEATS FOR MEMBERS

No tickets are necessary for admission to these lectures. A section of the Theatre is allocated to Members of the Museum, each of whom is entitled to two reserved seats. Requests for these seats should be made in advance by telephone (WAbash 2-9410) or in writing, and seats will be held in the Member's name until 2:25 o'clock on the lecture day.

NEW MEMBERS

The following new Members were elected in the period from August 16 to September 13:

Associate Members

Dr. Sidney Asher, Earl D. Eisenhower, Robert H. Lodge, Philip W. Lotz, Aldo L. Moroni, F. W. Pain, George H. Swift, Jr., Dr. Graham A. Vance

Sustaining Member

Dr. Stanley R. Korf

Annual Members

W. C. Anders, Richard R. Armstrong, James W. Bannon, C. T. Baumgart, Alfred S. Berens, Edgar R. Boone, John R. Bradley, Theodore Brand, Robert W. Christensen, Philip Corper, Robert E. Cryor, H. James Douglass, Todd A. Ebbers, Erle M. Ellis, Joseph R. Frank, Kernal Freeman, Lawrence B. Freeman, Dr. Alan B. Hayes, Stacy H. Hill, Dr. Lawrence L. Hirsch, John A. Houston, Robert E. Humphreys, Stanley L. Jarrow, Henry J. Jensen, Nathan J. Kaplan, Mathew Keck, Thomas V. King, Neal Lang, Robert L. Leopold, Edward A. Lundy, William G. Lynch, Donald J. McCoy, J. F. Mele, Edward A. Mosher, Stanley Paul, Samuel S. Reid, David C. Ruttenberg, Neele E. Stearns, C. L. Treadway, Gene Wedereit, Norman L. Weiss, Robert J. Williams

MUSEUM RECEIVES VALUABLE SHELL COLLECTION

By ALAN SOLEM

ASSISTANT CURATOR, LOWER INVERTEBRATES

The April BULLETIN told about a large collection of Okinawan shallow-water marine shells that the Museum had just received. This is a scientifically valuable collection because of the exact locality-data, but it is of little interest to the amateur shell-collector because only common species are represented.

Through the generosity of Walter Cherry of Winnetka, Illinois, the Museum has been presented with another type of collection —the shell collection that his mother made several years ago. Mrs. Cherry was interested in shells because of their beautiful shapes and coloration, and the greater part of her collection consisted of cowries, cones, olives, and murices that she had purchased from shell dealers. The specimens are in perfect condition and many represent rare deep-sea species highly prized by collectors. This is the first collection of its kind to come to Chicago Natural History Museum. It adds many species new to our limited collection of marine shells.

COLLECTORS' PRIZE

Thatcheria mirabilis has one of the most unusual shapes of any known mollusk. Long considered a great rarity, it is now available in quantity to shell dealers but is still treasured for its striking form.

Scaphella dohrnii, Conus sozoni, Murex beauii, Murex macgintyi, and the yellow color-forms of *Pecten ziczac* and *Oliva reticularis* are all greatly treasured by collectors. None of these were previously in this Museum. Besides the rare species listed above, Mrs. Cherry had many unusually large or fine specimens of the commoner Florida sea shells.

Of the foreign specimens from the Cherry Collection, two Japanese shells are of particular interest to collectors. *Pleurotomaria hirasei* is one of the dozen living species of slit shells, which are found only in deep water and are rare in collections. In past ages *Pleurotomaria*-like shells were very common, but today they persist only as deep-sea relics. The living shells, which actually belong to the genus *Perotrochus,* are more familiar to collectors under the name *Pleurotomaria.*

Another extremely interesting shell is *Thatcheria mirabilis* Angas. The species was described from a single specimen in 1877 and for many, many years no more were reported. The shape of the shell is so remarkable that in an authoritative monograph published in 1881 this statement is made: "That this shell is a scalariform monstrosity cannot be doubted." During the early 1930's a few additional specimens reached European collections, and in 1938 a British zoologist published a few notes on the animal. After World War II, Japanese shell-collectors began offering specimens to Americans and found buyers at $75 to $100 a shell. Within a few years, however, the market became flooded, and today *Thatcheria* is offered for as little as $5 for a perfect specimen. Like many "rarities," it is rather common, but it was many years before collectors learned how to find it.

Audubon Screen-Tour on Faraway Isles

"The Faraway Falklands," to be given October 20 at 2:30 P.M. by Olin Sewall Pettingill, Jr., will open the season of Sunday afternoon screen-tours offered by the Illinois Audubon Society in the James Simpson Theatre of the Museum. The lecturer will show his color-films of this remote group of islands, the most southerly of all British colonial settlements, lying in the far south Atlantic some 250 miles east of the coast of Patagonia. Only a few thousand people, mostly Scottish sheepherders, live on the islands, which are famed for some unusual geological features and, in history, as the scene of a great naval battle. Rookeries of several kinds of penguins are found there; most of the other wildlife consists of migratory birds from South America.

This and other Audubon lectures to follow in November, January, February, and March are free. Seats in the reserved section of the Theatre are available to members of the Audubon Society and the Museum on presentation of membership card.

Winter Visiting Hours

Effective October 15, the winter schedule of visiting hours, 9 A.M. to 4 P.M., will be observed at the Museum. On Sundays the hours will be 9 A.M. to 5 P.M. This schedule will remain in effect through February 28.

SNAKE'S TRAIL LEADS TO PRIZE IN ART SHOW

By A. STANLEY RAND
TEMPORARY ASSISTANT, DIVISION OF MAMMALS

THE STUDY OF SNAKES leads up many strange paths, but one of the most unexpected was a set of experiments that resulted in my competing in the Chesterton (Indiana) Women's Club Art Show.

Last spring an old interest in animal locomotion started me in search of a satisfactory method of recording snake tracks. By studying these I hoped to understand more about how snakes moved than was possible just by watching them. What I needed was some portable, easily available medium over which I could have the animals move and leave behind them a permanent record of their progress.

'ABSTRACT DESIGN'—BY A SNAKE

These figures are not from a Japanese screen. They are the tracks left by a large snake slithering and sliding on a smooth slippery surface.

The medium that I tried was smoked paper. A piece of smooth paper held over the flame of a candle quickly picks up a thin layer of soot. Moving the paper back and forth over the candle creates a black even surface that is removed by the slightest contact. Now I had only to set the paper down and have my animal crawl across. Wherever it touched the surface of the paper it rubbed off the lampblack. The result was a record of its progress, white on black, not unlike a photographic negative or a photostatic copy in appearance. The process is essentially that used in a kymograph, a standard piece of equipment in any general physiology laboratory.

AUTOMATIC DESIGN-MAKER

After a few promising tests with sow bugs and a milliped I tried a snake. The result, like many in scientific research, was unexpected. The snake had not left any pattern that I could interpret, and so I tried another piece of paper and another snake. This went on until I ran out of smoked paper. As I lined up the results I realized I still had nothing to help me understand how snakes move but I did have a series of patterns, graceful white strokes on a dead-black background, here bold and there delicate—not much as a scientific record but as artistic designs very attractive.

A student of snakes must follow wherever his line of research leads. So I set about refining my technique of smoking paper and catching more snakes of various sizes and having them make more snake tracks. Many of the results were poor, but some were so attractive that I fixed and mounted them and with a little encouragement entered them in the Photographs and Prints class in the annual Chesterton Women's Club Art Show. After the judging, though neither the snakes nor I had "ever had a lesson in our lives," we were awarded the blue ribbon in our class.

Since even people who are anything but prejudiced in favor of snakes found the designs attractive as well as novel, perhaps the refined technique is worth explaining. The shiny side of shirt cardboards made the best smoking surface because they are smooth and stiff enough to handle easily. A kerosene lamp proved quicker and more effective than a candle for smoking and eliminated the dripping of hot wax on things. Once the pattern has been made it must be fixed to prevent accidental smudging. I started with dilute shellac, but found that an artist's fixitive that came in a can like a bug bomb could be sprayed on more easily and was more effective in retaining the contrast.

SNAKES BECOME UNCO-OPERATIVE

The last necessity, of course, is snakes, and while any species and any size is satisfactory there is one problem. Though snakes are not generally rated very high in intelligence, they quickly learn that they don't like to crawl on a smooth, slick surface like shirt cardboards coated with lampblack. Consequently they soon decline to co-operate. However snakes are common even in the vacant lots of Chicago, and finding them is no real problem.

This, then, is the technique, and though it is far from elegant, it is relatively easy, cheap, and effective. Our only real complaint so far is from an eleven-year-old neighbor who tried it, but complained that her mother objected to her burning candles in her bedroom.

This method of recording snake tracks shows as yet little sign of being a valuable method of studying reptilian locomotion. It is, however, an interesting way of producing unusual and attractive designs. It is possible that it could also be used as a workshop technique for nature-study groups. Whatever its applications, I certainly found it both fun and interesting.

GIFTS TO THE MUSEUM

Following is a list of the principal gifts received during the past month:

Department of Anthropology:

Raymond J. Koch, Winnetka, Ill.—5 Pueblo Indian pottery vessels, Arizona and New Mexico; James Whitehair, Chicago—wooden Buddhist image, Korea

Department of Botany:

From: University of Georgia, Athens—5 coreopsis; Ministry of Agriculture, Karachi, Pakistan—4 samples of cowpea seeds; Dr. Earl E. Sherff, Hastings, Mich.—5 plant specimens, Hawaii and Michigan; Dr. Barbara Palser, Chicago—10 African plants; Punjab Agricultural College, Karachi, Pakistan—5 seed samples of agricultural legumes; Floyd A. Swink, River Forest, Ill.—51 Illinois and Indiana plants; U. S. Department of Agriculture, Madison, Wis.—2 pines, Honduras

Department of Geology:

From: Juanita Mines and Laboratories, Blythe, Calif.—mineral collection; John E. Russell, Bloomingdale, Ind.—mammoth tooth

Department of Zoology:

From: Dr. Henry Field, Coconut Grove, Fla.—5 frogs, 5 snakes, 53 lots of fresh-water and marine invertebrates; Donald R. Moore, Ocean Springs, Miss.—18 shells, Dauphin Island, Alabama; Mrs. Ruth Allen Fouche, Chicago—60 seashells, 20 sea-urchin tests, Puerto Rico; Glenn E. Haas, Deerfield, Ill.—2 fleas, Wisconsin; Tierpark Hellabrunn, Munich, Germany

'EXTINCT' SNAIL FOUND; HAD BEEN HIDING 300 MILLION YEARS

By FRITZ HAAS
CURATOR OF LOWER INVERTEBRATES

ALTHOUGH the vast majority of existing plants and animals are known, a scientist may still discover species that had escaped our knowledge. On an expedition, in which groups of scientists join, the chances of such discoveries are still greater. Should, however, such an expedition be a marine one, with a specially equipped ship to stay on and to work from, then the hopes for some surprising discoveries are high. Thus it happened in the case we are going to speak of.

A Danish ship, the *Galathea*, was on an oceanographic expedition from 1950 to 1952. Off the west coast of Mexico her nets brought up a few living snails. At first they did not appear to be of special interest. They were limpet-like creatures, about an inch and one-half long and one-half inch high. Their importance to science became apparent only after a Danish zoologist, Dr. Henning Lemche, had studied their soft parts anatomically.

These new snails turned out to be different from any other known living ones. Without going into details, I might say that the soft parts of the novel animals were not attached to their shells by a circular muscle, as in the true limpets, but by pairs of small muscles, eight on each side. When the soft parts were removed from the hard shell, the impression of these muscles could be clearly seen in the interior side, close to the outer margin. This feature is something unheard of in snails living in our time.

FOSSIL RELATIVES

This discrepancy from everything in the anatomy of modern snails, noteworthy as it may be, leads however to even more surprising facts. At a time in the history of the earth, as far back as 300 million years and more, periods called Cambrian, Ordovician, Silurian, and Devonian, there were snails in the ocean that very closely resemble our novelty from modern Mexican waters. Their scientific name is Tryblidiidae. The soft structure of these snails is, of course, unknown, as only their fossil shells have been found. However, as we know, certain inner organs leave traces on the shell, as, for instance, the muscles by which the soft parts are firmly attached to the protecting shell. In these old, old fossil snails the impressions of the attaching muscles are visible, and these muscle scars are arranged in pairs, eight on each side!

Considering the high degree of resemblance of their shells and the identical arrangement of the attaching muscles, there cannot be left any doubt that the old snails, believed to be extinct since Devonian times, and the modern ones from Mexican waters are closely related.

Close relationship of certain modern animals with others that had been living in even older times than the Cambrian is known. In these cases, however, fossil representatives of the groups are known from the first time of their appearance, through all the geological eras, to the living forms of our present quaternary period. In other words, there is no gap between the fossil and the living representatives.

WHERE DID THEY HIDE?

The fossil Tryblidiids, however, disappeared at the end of the Devonian period. That means that in none of the younger fossiliferous rocks have Tryblidiids been found. Suddenly now, after a period of roughly 300 million years, a living Tryblidiid has appeared. How could this happen, after this group had been "officially declared dead" and considered to be extinct? Has nature, perhaps, a cache where such "lost" members of the animal kingdom survive? It really looks as if this were true.

There exists a vast, imperfectly known niche for animal life, and this niche is the deep sea. It was there that the *Galathea* expedition found our living Tryblidiid, at a depth of 3,590 meters (11,775 feet). Let us remember, also, that a few years ago a living representative of a group of fishes believed extinct since the late Cretaceous, some 60 million years ago, the Coelacanthids, was secured from the deep waters between Madagascar and the Seychelle Islands.

This story would be incomplete if we did not discuss the following problem: When and why did the Tryblidiids leave the shallow-water habitats they lived in during Devonian times and go into hiding in the deeps?

The deep sea is believed not to have changed the living conditions of its animal inhabitants since the oldest times. Absolute darkness and an icy temperature must have reigned there from the very beginning. So far as known no portions of the deep-sea bottom have been raised to or above sea-level. All the many rocks containing fossils of marine animals originated as deposits in shallow waters. It was in such that the fossil Tryblidiids were found. Why, then, at the end of the Devonian, did they disappear from the shallow waters only to be rediscovered now in the deep sea? It is not impossible, though not proven, that, besides their shallow-water forms, which we find as fossils, there were already Tryblidiids living in the deep sea at these early days, and these only have survived. The other ones have disappeared without any visible reason. This catastrophe occurred at the end of the Devonian, and that takes care of the question "When." The "Why," however, is not so evident. We do not know if other, perhaps predacious, animals made the Devonian Tryblidiids move into the undisturbed deep sea, or if the already abyssal Devonian Tryblidiids could survive in the undisturbed deep sea while their cousins in the shallow-water zone fell victim to some ecological change they could not resist.

We may confidently expect more such relics of bygone times to turn up from time to time in nature's "Lost and Found Counter," the deep sea.

SATURDAY PROGRAMS FOR CHILDREN

The autumn series of free entertainments for children (motion pictures—except for the first program, which will be Indian dances) will open on October 5 and continue on each Saturday morning until November 30. The shows, which begin at 10:30 A.M., are presented in the James Simpson Theatre under the auspices of the James Nelson and Anna Louise Raymond Foundation. No tickets are needed. Children are invited to come alone, accompanied by adults, or in groups from schools and other centers.

Following is the schedule for the season:

October 5—Indian Dances and Stories
The Laubins in person

October 12—Columbus Day Special (2 movies)
Story of Christopher Columbus
Gold Rush Boy
Also a cartoon

October 19—Alice in Wonderland
(Walt Disney's version)

October 26—The Phantom Horse
Family life on a modern horse-farm in Japan

November 2—An Indian Program (3 movies)
Pioneer Boy in the Midwest, The Oregon Trail, and Indian Family of Long Ago
Also a cartoon

November 9—From Penguins to Ostriches
Also a cartoon

November 16—White Mane
A story from southern France of the fisher-boy Folco and his wild horse White Mane

November 23—Adventures with Camera and Spear
Sasha Siemel, known as the Tiger Man, will tell his story

November 30—Winter Hobbies
Also a cartoon

TWO MUSEUMS REUNITE A SHARED EGYPTIAN

By RICHARD A. MARTIN
CURATOR, HARRIS EXTENSION

AN EXQUISITELY sculptured black-granite head, fragment of an ancient Egyptian statue in the round, rested on its pedestal in Hall J for many years labeled simply "Head of a Priest of Amon, Thebes." It was purchased in Cairo nearly sixty years ago by Edward E. Ayer, a Benefactor of the Museum and Trustee from 1893 to 1927. The fragment bears no inscription that identifies the man portrayed. Now we know it to be the head of Montuemhat, a great and powerful Egyptian who became mayor of Thebes in the reign of Egypt's Ethiopian king Taharka and successfully survived the destruction of Thebes during the Assyrian domination of Egypt (*circa* 670-663 B.C.).

REGAINS HIS TORSO

The sculptured head of Montuemhat, mayor of Thebes about 2,600 years ago, has long been displayed in the Egyptian collections of Chicago Natural History Museum. Brooklyn Museum had a torso. When Egyptologists of both institutions got together, it was proved both specimens were fragments of same statue. Photo shows how they fit.

Identification came about through co-operation with members of the staff of the Brooklyn Museum. Early in 1955 my good friend Mrs. Elizabeth Riefstahl, at that time Brooklyn's Assistant Curator of Egyptian Art, brought to my office a torso fragment of black granite from Brooklyn's Wilbour Collection. Across the breast of the torso was a band bearing the legend, "The count and prince, the fourth prophet of Amon, mayor of the city, Montuemhat, may he live." The idea that the head and torso fragments might be from the same sculpture had occurred to Dr. John D. Cooney, Curator of Egyptian Art at the Brooklyn Museum, some months earlier when he had had an opportunity to study our material during a visit to Chicag o Natural History Museum.

REJOINED STATUE, REAR VIEW

Now, through exchange of plaster casts, the museum in Chicago and that in New York each have a more complete figure of Montuemhat, who was a priest of Amon as well as mayor of Thebes.

Before Mrs. Riefstahl's arrival with the torso we had moved the head from Hall J to my office and painstakingly disengaged it from the exhibit mount so that the fit of the fracture surfaces on the two fragments could be checked. Carefully we placed the head in position over the torso. Dr. Cooney had been right. The two pieces belonged together.

Montuemhat was a wealthy prince and descendant of an ancient noble family. As mayor of Thebes he was perhaps the most powerful Egyptian of his time and virtual ruler of Upper Egypt. As a patron of the arts he contributed much to the revival of art in Egypt. The splendid tomb he built for himself at Thebes equaled in beauty and grandeur other tombs in the great cemetery dating from far more ancient and illustrious ages in Egypt's long history. Of the many statues of Montuemhat that have been found in Theban temple excavations, most are now in the Cairo Museum. So far as we know, our head of Montuemhat is the only one in this country.

Plaster casts have been made of the head and torso and exchanged between the Chicago and Brooklyn museums. We are hopeful that more of the missing pieces may be found in other collections. In the meantime, the head of Montuemhat, priest of Amon, again may be seen in Hall J (Case 40).

STAFF NOTES

Dr. Karl P. Schmidt, Curator Emeritus of Zoology, was honored with the year's "Eminent Ecological Citation" at a meeting of the Council of the Ecological Society of America held recently at Leland Stanford University .... **Dr. Theodor Just,** Chief Curator of Botany, presented a paper, "Synopsis of Gingkophytes," at the annual meeting of the American Institute of Biological Sciences held at Stanford University .... **Dr. Julian A. Steyermark,** Curator of the Phanerogamic Herbarium, also attended the meetings of the American Institute of Biological Sciences and participated in the activities of the Nature Conservancy and the American Society of Plant Taxonomists (the last-named appointed him to a special committee for the Botanical Society of America) .... **Mrs. Jane Comiskey** has been appointed Manager of the Museum Book Shop. She is a graduate of De Pauw University and studied also at the University of Oslo, Norway, as an exchange student. For several years she was sales manager of the book department of a Loop department store .... **Dr. Austin L. Rand,** Chief Curator of Zoology, lectured on "Migration in Malaysia" at the meetings of the American Ornithologists' Union at Cape May, New Jersey. **Melvin A. Traylor,** Assistant Curator of Birds, also attended the meetings, after which he made a study trip to the American Museum of Natural History, New York, and the U. S. National Museum in Washington .... **Roland W. Force,** Curator of Oceanic Archaeology and Ethnology, has returned from a six-week study trip in Europe. He examined Pacific collections in the important museums of Britain, France, Belgium, the Netherlands, Germany, and Switzerland. While in England he had occasion to inspect the private collection of Pacific materials owned by Captain A. W. F. Fuller .... **John Moyer,** head of the Museum's Division of Motion Pictures, recently presented his new film program, "People and Places in India," for the patients and staff of the Veterans' Research Hospital, Chicago.

Daily Guide-Lectures

Free guide-lecture tours are offered daily except Sundays under the title "Highlights of the Exhibits." These tours are designed to give a general idea of the entire Museum and its scope of activities. They begin at 2 P.M. on Monday through Friday and at 2:30 P.M. on Saturday.

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Bulletin

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Karl P. Schmidt

Chicago Natural History Museum

FOUNDED BY MARSHALL FIELD, 1893

Roosevelt Road and Lake Shore Drive, Chicago 5

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Members are requested to inform the Museum promptly of changes of address.

KARL PATTERSON SCHMIDT

1890–1957

WITH THE DEATH on September 26, 1957, of Karl Patterson Schmidt, Chicago Natural History Museum lost a most distinguished staff member.

Karl Schmidt was born in 1890 at Lake Forest, Illinois, and attended the public schools, Lake Forest Academy, and then Lake Forest College, where he won three freshman prizes for scholarship. His schooling, but not his education, was interrupted at the end of his freshman year by six years of true pioneer farming in Wisconsin. In 1913 he returned to school, this time to Cornell University, and received his bachelor of arts degree in 1916.

Following his graduation, Karl Schmidt became Assistant in Reptiles and then Assistant Curator of Reptiles at the American Museum of Natural History in New York. In 1922 he joined the staff of Chicago Natural History Museum as Assistant Curator of Reptiles, later became Curator of Reptiles, and, in 1941, was appointed Chief Curator of Zoology. In 1955 he retired to become Curator Emeritus of Zoology.

During his years in the Division of Reptiles, the collection was multiplied tenfold, and the Museum became one of the important centers of herpetology in the world. As Chief Curator of Zoology, Karl Schmidt stimulated the growth of those divisions of zoology that had previously been relatively small, encouraged work in the large divisions, and developed a marvelous cooperative spirit among the staff members of his department.

Research workers who write a great many scientific articles without producing a single worthwhile idea unfortunately are not rare. Other scientists have ideas that die with them because they never complete any work. Only rarely is a scientist able both to turn out a great deal of work and to produce ideas that stimulate other scientists. Karl Schmidt was one of these unusual and valuable men. He was not a narrow specialist and, besides the nearly 150 herpetological articles he wrote, he was co-author of two books that are the most important recent works in the broad fields of animal geography and animal ecology. His worldwide reputation led to his election to the National Academy of Sciences, the greatest honor that can be given an American scientist.

Yet Karl Schmidt was more than an accomplished scientist. He was a great human being. It is extremely difficult to explain to anyone who did not meet Karl exactly what I mean by that. Perhaps one measure of his greatness is the large number of people who met him just once and never forgot the experience. The number of lives that were affected critically by one encounter with Karl Schmidt is remarkable. And these people are found from South America to Canada, from China across the United States to Europe. Some of them are biologists, but many are not.

It is well-nigh impossible to account for this influence by listing a man's qualities. Nevertheless, I think that what people responded to in Karl Schmidt was the example of a man using the potentialities of human existence to the fullest. He lived more in a week than most of us do in a year. And his life had emotional as well as intellectual content.

Lest I convey the impression that we are dealing with a paragon, let me hasten to add that Karl had his biases, and some of them were amusing. An editorial in *Harper's Magazine* criticizing American farmers, one of Karl's favorite groups, so aroused his righteous indignation that we were grateful that the editor was far removed from the Schmidt home. Karl was no more capable of being analytical in political and economic matters than most of us. When a political figure irritated him, the irritation was tremendous, for nothing about Karl Schmidt was petty or small. Those are words that one could never apply to him.

A streak of the mischievous and the perverse in Karl's character both amused and defeated those of us who knew him well. But these two characteristics enabled him to take a detached and analytical view of his science and to stick to his guns when he knew he was right. And he usually was.

Most men of outstanding ability and achievement gradually assume a sense of infallibility. This weakness was escaped by Karl Schmidt because he was so modest. Honors that came his way seemed always to surprise him, when his associates were astonished only because the honors always seemed so overdue.

How can these and other of Karl Schmidt's qualities be summarized? Passion, compassion, vitality, humor, modesty. No matter how many words are added they still will not explain or describe Karl adequately. For a great man's character cannot be circumscribed by words.

Therefore, to tell people who did not know him what Karl Schmidt was like is impossible. And those who did know him need not be told. We who were privileged to be closely associated with Karl feel sorry for everyone who was not.

—R.F.I.

"PEOPLES OF THE WORLD": FRIDAY EVENINGS

Four more lectures in the series "Visits with Peoples of the World" will be given on Friday evenings during November in the James Simpson Theatre of the Museum. Distinguished anthropologists, including one from the staff of the Museum, will appear. The course is offered by University College of the University of Chicago. On the Saturday following each lecture there will be a field trip to the Museum, where members of the audience may view exhibits correlated with the subject of the lecture.

All these lectures begin at 8 P.M. Following are the dates, subjects, and speakers:

November 1—Middle America: Descendants of the Maya. Sol Tax, Chairman, Department of Anthropology, University of Chicago

November 8—South America: Native Peoples and Their Culture. Donald Collier, Curator of South American Archaeology and Ethnology, Chicago Natural History Museum

November 15—The Peoples of West Africa. Warren d'Azevedo, Department of Anthropology, Northwestern University

November 22—The Negro and His Music in the New World. Alan P. Merriam, Professor of Anthropology, Northwestern University

Price of admission to single lectures is $1. Students' single admissions are 75 cents. Tickets may be purchased at the door.

HISTORY OF AN ANCIENT PEOPLE UNFOLDS IN ARIZONA

By PAUL S. MARTIN
CHIEF CURATOR, DEPARTMENT OF ANTHROPOLOGY
AND
LEADER, SOUTHWEST ARCHAEOLOGICAL EXPEDITIONS

EIGHT CHILDREN—under ten years of age—dead out of a population of forty to sixty souls! And seven adults, too—in a village that was occupied for comparatively few decades. Fifteen burials in all.

That is the story that unfolded as the Museum's crew of scientists and diggers of the 1957 Southwest Archaeological Expedition excavated a trash-burial mound belonging to a peaceful Indian village of perhaps twelve rooms near Vernon, Arizona.

ANCIENT VILLAGE IS DISCOVERED

Portions of a pithouse village of about A.D. 600 are shown in various stages of excavation by members of the Museum's Southwest Archaeological dig. Site is the Earl Thode ranch at Vernon, Arizona.

The ancient site is located on the property of Mr. and Mrs. Claude Phipps in a beautiful glade in the foothills of the White Mountains on the banks of Vernon Creek. We did not have time to excavate the living rooms or the large ceremonial plaza, but we did dig out the trash mound in which the burials are.

Fifteen burials is a rather large number for such a small village, a larger number than we usually find.

But the remarkable circumstance about this story is the finding of such a large proportion of infant burials.

With one child were eight pieces of pottery, placed in the grave presumably as containers of food for use in the life hereafter. The graves of the other children each yielded one or two pieces of pottery placed there as a mortuary offering. We found eighteen pieces of pottery in the mound.

What caused such a high proportion of children to die? Did an epidemic strike the village? Did starvation cause the children to die prematurely? Or was the death rate a usual one for this area? We don't know the answers. But if life insurance had been in vogue among these people in the 11th or 12th centuries after Christ, the premium rate would have been high. Possibly, indeed, life insurance for the children would have been declined entirely.

In past summers excavations in New Mexico by the Museum's expeditions have revealed some 4,000 years of the history of the Mogollon Indians, a people about whom virtually nothing was known before 1935. Twelve years of digging (1939–55) and patient researches near Reserve, New Mexico, enabled the Museum scientists to determine that the Mogollon Indians had deserted that area sometime between A.D. 1250 and 1350. The Museum scientists also concluded that some of the Mogollon Indians had moved west and northward from New Mexico into Arizona. Accordingly, the Museum acquired in 1956 a small shack suitable for living and laboratory headquarters in Vernon, Arizona.

The season of 1957 marks the first digging in this virgin territory. If the succeeding seasons are as brilliantly productive as this one, the Museum's archaeological expeditions are slated to make remarkable records that will surpass even those of 1939–55.

MORE DIGGING NEEDED

It is premature to set forth any conclusions about what we found this summer. We have not yet had time to count and classify all the hundreds of specimens that were dug up, let alone analyze and interpret them. These tasks will require several months of concentrated work. And even when we have evaluated the information acquired this season we shall still need to dig and learn more before we can fit our data into a comprehensive whole. Not until we had compiled all of our data from the fifteen New Mexico digs were we able to make a coherent whole of the mass of evidence we had dug up. For what we are digging up is history—unwritten, true—but history that was unwittingly left behind by prehistoric folk in a sort of "code." Patience and insight break down this code into a series of deductions based on voluminous testimony gathered by the spade and the trowel. A brief review of the Mogollon history is now being especially prepared for laymen.

As stated earlier, we guessed that the Mogollon people moved to the Vernon, Arizona, area after abandoning the Reserve, New Mexico, territory. Why the exodus took place, we do not know, but a few interesting speculations will be presented in the forthcoming popular "history."

How early did the Mogollon folk come to Vernon and what conditions did they find? Were there other peoples already here and, if so, who were they?

THE CONCHO CULTURE

The earliest occupants of this area were apparently not Mogollon (as in New Mexico) but were a people possessing what is called the Concho culture. This complex, as well as the Mogollon culture, were both probably part of a larger, older culture called the Desert Culture that extended from Oregon to the Valley of Mexico and from the Rocky Mountains to the Pacific Coast.

The Concho culture in particular may be characterized as a simple basic culture in which the people gathered seeds and wild plants but did little hunting, lacked pottery and agriculture, wove baskets and sandals, used a spear-thrower rather than a bow and arrow, made a fairly distinctive projectile point that was relatively small in size, and

lived on the higher beaches of now-extinct lakes. Their homes were probably skin or brush shelters and must have amounted to little more than campsites. We deduce this because these Concho folk were not truly sedentary but probably lived in small bands sparsely scattered over the country.

We trenched two such campsites on old lake beaches and found no evidence of houses—which was to have been expected. A good collection of burned rocks that marked campfires, manos, metates, and chipped artifacts such as projectile points, scrapers, and choppers, and some burned animal-bones was gathered. Charcoal from firepits was carefully preserved with the hope that we can obtain a radiocarbon date for these sites. We surmise that such settlements are fairly old—perhaps as much as 2,000 years—dating from about the time of Christ.

PROGRESS REVEALED

We don't know exactly what happened next, but when we again catch sight of the Concho people they have come up in the world. By perhaps A.D. 600 they had learned how to make pottery and how to construct pithouses. We dug eight such houses, some of which were 6 feet deep and 12 feet across. Some were irregular affairs and seemed to have been made by novices. The pottery was plain undecorated ware and appears to fall into six types: (1) a plain brown ware and (2) a plain red ware—both of which seem to have Mogollon affinities; (3) a ware that is brown on the exterior and gray on the interior—this type may represent a mixture of Mogollon tradition (brown color) and an early Pueblo or northern tradition; (4) a polished dark-gray ware that also may be a hybrid; (5) a smudged ware; and (6) a small percentage of gray ware that is definitely early Pueblo or northern pottery.

We suspect that the knowledge of pottery-making and house-building was acquired from outside sources. We assume that corn, beans, and squash were grown and that they also were borrowed, perhaps from Mogollon sources.

POTTERY CAME LATER

A little later, perhaps by A.D. 800, the people began to build surface rooms, the walls of which were of crude masonry, and to make slightly different pottery. We dug one such village. Still later, perhaps at A.D. 1000-1100, these Indians lived in still larger, better villages of perhaps twelve to fifteen rooms, housing forty to sixty people, and built a special room (kiva) for ceremonial purposes. It was in the burial mound of one such village that we encountered the fifteen burials that may represent the higher-than-expected death rate mentioned earlier.

One mysterious situation should be reported. On the top of a knoll on the near-by Curtis ranch was a goodly sprinkling of potsherds, and on this basis we assumed that a village of sorts had been built there. Extensive trenching failed to turn up a wall, a floor, or, in short, any trace of a house of any type. This is the big mystery of the season—how did all these pottery fragments happen to be on top of a hill with no indications of occupation to accompany them? We don't know the answer. Certainly the sherds were not washed *up* the hill!

BRIEF SUMMARY

This very brief summary of our accomplishments—hundreds of cubic yards of trenches, ten pithouses, six surface rooms, and enough artifacts to keep us busy for several months in analysis and interpretations—is all that can be recounted at the moment. We suspect that Mogollon Indians moved over to the Vernon area about A.D. 500. We further guess that the conditions of life were pleasant, that there was plenty of water and arable land, and that there were no unfriendly people about. We feel fairly certain that there were other Indians there—the Concho people—who may have been distant cultural, linguistic, and blood kinfolk. As time went on, Mogollon influences here became stronger.

I might add a few words about our archaeological research station in Arizona. We are 100 miles from a railroad, near the foothills of the White Mountains at an elevation of 7,000 feet, on an almost treeless plain. The region is buffeted by strong winds (50 to 60 miles per hour) in the spring, early summer, and fall.

HUNDREDS OF SITES

There are many reasons why this station should be successful, one of which is that there are hundreds and hundreds of sites within a radius of forty miles. Another reason is that the country has never been worked archaeologically and is therefore terra incognita. A third reason for assured success is the manner in which the people near and far have welcomed us as neighbors and friends. Everyone wants to help, and hardly a day passes without the report of a new site from some friendly rancher.

Since we have two national forests at our back door, hundreds of square miles of terrain to explore, and elevations varying from 5,000 to 10,000 feet, we have an unparalleled opportunity to carry on our work in a most advantageous manner. Success is assured under such conditions, and the students who accompany us cannot fail to learn by doing.

The members of the staff this season, in addition to the writer, were: Dr. John B. Rinaldo, Assistant Curator of Archaeology; Mrs. Martha Perry, cook; Roland Strassburger, general assistant and photographer; Miss Elizabeth Morris and Mrs. John Rinaldo, who washed and catalogued the pottery and artifacts; and two students—Emerson Mulford and Marvin Christensen.

It is a pleasure to acknowledge our deep appreciation for the co-operation of neighboring ranchers who permitted us to dig on their land: Earl Thode, Mr. and Mrs. Claude Phipps, Mr. and Mrs. Lester Curtis, and Frank Stradling.

GIFTS TO THE MUSEUM

Following is a list of the principal gifts received during the past month:

Department of Anthropology:

From: Mrs. F. L. Burley, Chicago—pot, sherds, and flints, Indiana; Dr. David C. Graham, Englewood, Colo.—Chinese *liu-sheng* and wood chip, China; Miss Nyunt Han, New York—2 lacquerware table mats, Burma

Department of Botany:

From: J. I. Aguilar G., Guatemala—1,000 plant specimens; Dr. Leandro Aristeguieta, Caracas, Venezuela—44 plant specimens; Davenport Public Museum, Davenport, Iowa—21 Rosa; Kendall Laughlin, Chicago—2 Crataegus; Eli Lilly and Co., Indianapolis—11 plant specimens, 10 drug samples of plants, New South Wales, Fiji Islands; Ministeria de Agricultura & Cria of Venezuela—a *Zanthoxylum syncarpum;* E. J. Palmer, Webb City, Mo.—812 plant specimens; Floyd A. Swink, River Forest, Ill.—12 plant specimens

Department of Geology:

From: Dr. Henry Field, Coconut Grove, Fla.—Pleistocene seashells and coquina samples; Reichel-Dolmatoff, Cartagena, S.A.—vertebrate and invertebrate specimens; Capt. John Sinkankas, Arlington, Virginia—hambergite specimens

Department of Zoology:

From: George Luckow, Evanston, Ill.—224 insects, Austria; Dr. Jeanne S. Schwengel, Scarsdale, N.Y.—17 lots of marine shells; Tierpark Hellabrunn, Munich, Germany—2 European bison; Harry Hoogstraal, Cairo, Egypt—121 mammals, 31 lizards, 21 snakes, a turtle, Egypt and Tanganyika; Institute for Medical Research, Kuala Lumpur, Malaya—10 chigger mites; N. L. H. Krauss, Honolulu—7 land snails, a toad, 7 lizards, Africa; Dr. Fred Medem, Bogotá, Colombia—3 turtles, 10 crocodile eggs, a crocodilian skull; Raffles Museum, Singapore—7 lizards; Dr. Karl P. Schmidt, Homewood, Ill.—2 lizards, China

Daily Guide-Lectures

Free guide-lecture tours are offered daily except Sundays under the title "Highlights of the Exhibits." These tours are designed to give a general idea of the entire Museum and its scope of activities. They begin at 2 P.M. on Monday through Friday and at 2:30 P.M. on Saturday.

Special tours on subjects within the range of the Museum exhibits are available Mondays through Fridays for parties of ten or more persons by advance request.

CURATOR WOODS REPORTS ON CARIBBEAN CRUISE

Loren P. Woods, Curator of Fishes, has returned from a six-week exploratory fishing cruise in the western Caribbean Sea. The cruise was made aboard the U. S. Fish and Wildlife Service motor vessel *Oregon*.

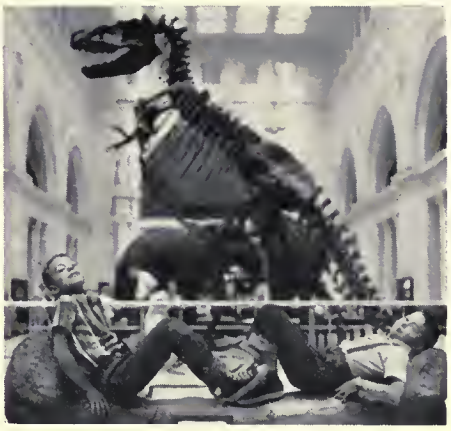
The *Oregon* sailed on August 15 from her home port at Pascagoula, Mississippi, and returned on September 26. The main objective of the cruise was to explore the offshore banks of the western Caribbean, trawling for deep-water shrimp and longlining for yellowfin tuna. The complex of submerged banks investigated lies at various depths in a broad band off the northeast coast of Nicaragua extending toward Jamaica. Nearly 100 trawling stations were made along the northern edges of Gorda and Rosalind Banks, in the troughs between these banks, and along the 100-fathom contour off the Mosquito Coast of Nicaragua.

Although bottom suitable for trawling was seldom found in depths of less than 100 fathoms, trawling in deeper waters (200 to 500 fathoms) was carried on successfully and resulted in the collection of a great variety of fishes and invertebrates from these depths. Several kinds of fishes previously rare in museum reference collections were preserved and several kinds were discovered that have never been described. Since virtually no trawling in deep water had ever been done in the Caribbean, most of the forms collected were not previously known from south of the Gulf of Mexico or Cuba, and so the known ranges of several species are greatly extended. The collection is now being unpacked and sorted.

In addition to the deep-water fishing, the atolls known as Quito Sueño Bank and Serrana Bank were visited and small coral-reef fishes collected at the latter by means of chemicals. Old Providence Island, Little Corn Island, Swan Island, and Mujeres Island also were visited, and in these places fishing was done after dark with a large trap net under a light. Some fishing with a light was done in Limon Bay, Panama, where the *Oregon* spent four days taking on fuel and supplies.

Tuna longline fishing (using 15 to 18 miles of line) was done in the Gulfo de los Mosquitos and offshore along western Panama, Costa Rica, and Nicaragua. Several tons of yellowfin tuna were caught on the longlines along with a variety of sharks and small species of tuna and barracuda, marlin, dolphin, blue runner, and lancet fish. The stomachs of all of these were opened and some very unusual fishes taken from the pouchlike stomachs of the lancet fish.

The *Oregon's* crew fished 24 hours a day for 22 days and a few hours of the day or night during ten additional days. But the Caribbean Sea has an area of nearly 750,000 square miles (about the same area as Mexico), and so, although this brief concentrated effort resulted in many discoveries, the area covered has scarcely been sampled.



DOUGLAS AND THE DINOSAURS

Douglas Reade, right, of Bellingham, Washington, and companion Boris Dincov of Redmond, Washington, rejoice on a thigh bone of Argyrosaurus in Stanley Field Hall as another dinosaur, Gorgosaurus, surveys scene from a discreet distance. Douglas, an avid student of dinosaurs, wrote to the Museum to ascertain extent of its dinosaur and other fossil exhibits before deciding to visit here while on a recent trip to the Midwest. He and Boris seem to be satisfied with results.

FIVE LECTURES REMAIN IN AUTUMN SERIES

Five more lectures in the autumn series of free lecture-films for adults will be given in November. The adventure-filled programs, provided by the Edward E. Ayer Lecture Foundation Fund, begin at 2:30 o'clock on Saturday afternoons in the James Simpson Theatre. Attendance is limited to adults, but free movie-programs for children are presented on the mornings of the same Saturdays. No tickets are necessary. Members of the Museum, each of whom is entitled to two reserved seats, should make their reservations in advance by telephone (WAbash 2-9410) or in writing (seats will be held in the Member's name until 2:25 P.M.).

Following are the November programs for adults:

November 2—South from Zanzibar
Clifford Kamen

November 9—Yucatan
James Metcalf

November 16—Islands of the Caribbean
Nicol Smith

November 23—Adventures with Camera and Spear
Sasha Siemel

November 30—Portugal, Madeira, and the Azores
Karl Robinson

MOVIES FOR CHILDREN DURING NOVEMBER

The autumn series of free movies for children, presented in the James Simpson Theatre by the James Nelson and Anna Louise Raymond Foundation, will continue through November on Saturday mornings at 10:30 o'clock. Boys and girls may attend the movies alone, in groups, or accompanied by adults. No tickets are needed. The programs and dates for November are:

November 2—An Indian Program (3 movies)
Pioneer Boy in the Midwest, The Oregon Trail, and Indian Family of Long Ago
Also a cartoon

November 9—From Penguins to Ostriches
Also a cartoon

November 16—White Mane
A story from southern France of the fisherboy Folco and his wild horse White Mane

November 23—Adventures with Camera and Spear
Sasha Siemel, known as the Tiger Man, will tell his story

November 30—Winter Hobbies
Also a cartoon

NEW MEMBERS

The following new Members were elected in the period from September 16 to October 15:

Associate Members

Raymond A. Hoffman, Harold R. King, Eugene F. Ryan, Paul A. Schroeder, Orville Taylor

Sustaining Member

Wylie G. Akenson

Annual Members

Lorn E. Arnold, Burnham L. Batson, Paul A. Benke, William A. Brandt, Scott F. Burton, Edgar J. Call, William G. Chorn, R. I. Chutkow, Dr. George C. Coe, Deforest Paine Davis, Arthur Dixon, Benno B. Epstein, Sidney Feuchtwanger, Charles D. Fraker, Perry L. Fuller, W. Kelly Gardner, Byron M. Getzoff, Joe Godfrey, Arthur H. Haigh, Laurence T. Herman, W. P. Hollis, John T. Honquest, Jr., William E. Kentor, Donald E. Kidd, Arthur Klutznick, Philip M. Kolb, Homer B. Marxer, Miss Martha Meyer, Grant U. Meyers, George Mitchell, Mrs. Carl R. Moore, John Pakel, Sr., Dr. D. J. Pellettieri, Vernon L. Pellouchoud, Tyson E. Poppell, D. J. B. Prins, Richard J. Radebaugh, Ernest Richter, Herzl Rosenson, R. V. Schageman, Harold J. Schloer, John B. Schlossberg, Dr. Edward J. Schmehil, Dr. William A. Smallberg, Dr. George L. Steans, Dr. Robert S. Study, Mrs. C. Conover Talbot, Norman L. Thomas, Mrs. William E. Vogelback

CURATOR COMMENTS ON BEETLES, COLLECTIONS, MUSEUMS

By RUPERT L. WENZEL
CURATOR OF INSECTS

IN 1941 Chicago Natural History Museum acquired its first important specialized study-collection of beetles. This was a collection of the family Histeridae (the writer's specialty) that was formed by a New York publisher, Charles Ballou. Since that time a number of other outstanding collections of beetles (and other insects) have been acquired, several of them from abroad. The most recent of these were the Knirsch collections of cetoniid and lucanid beetles (see Museum BULLETIN, September, 1957). The articles written about these collections seem to have given some of our friends the impression that (1) our collections, especially of beetles, are tremendously large and that (2) the living world consists of nothing but beetles.

The first impression is misleading. The second, though not true, has enough truth in it that we almost believe it ourselves.

GOLIATHS—LARGE AND SMALL

Two goliath beetles display their variation in size and their highly decorative upper-sides. Both are from the Knirsch collection of more than 30,000 Cetoniid beetles recently acquired by Museum.

Though the beetles may not have inherited the earth, there is some reason for thinking they have.

There are more kinds of insects than of all other living things—animals and plants combined. From four-fifths to five-sixths of all animals are insects. Because there are no world catalogues available for most groups of insects, no one really knows how many species have been described, although estimates run as high as 1,500,000 species for the world. As a matter of fact, there are no recent catalogues for most groups for North America. However, a figure of 800,000 to 850,000 for the world is generally regarded as being reasonably accurate. New species are being described at the rate of about 5,000 to 6,000 per year, and projected estimates of the number of species that actually exist range from 2 to 4 million, with 2 million as the minimum figure. About 41 per cent, or 350,000, of the described species are beetles!

THE FLOURISHING WEEVILS

If one recalls that there are about 46,000 species of birds, fishes, reptiles, and amphibians combined, the magnitude of the evolution that has taken place in the beetles can be somewhat appreciated. Beetles are divided into from 150 to more than 200 families, depending upon the classification followed. A family may contain a single species or as many as 50,000; a number of families include from 10,000 to 20,000 species. The figure of 50,000 species is for the largest family of organisms, the weevils.

The amazingly successful evolution of the weevils has been closely tied to that of flowering plants upon which most of them feed. Sir Guy Marshall, the world authority on the weevils, estimates, from the rate at which they are being described, that the ultimate total of the species of weevils will be between 200,000 and 250,000! Yet, in spite of the fact that the weevils are of considerable economic importance, the writings on this large group are scattered, and the number of specialists who study it are few. There is not yet a published key to the subfamilies and tribes of weevils of the world. This partly refutes the prevalent idea that if a group of animals is of economic importance, it will necessarily be studied forthwith, and the classification and associated problems neatly solved. In the case of the weevils, the work of classifying, describing, and cataloguing the species that exist will require the efforts of hundreds of specialists over a long period of time.

At any given time there may be no specialists for many major groups of beetles (or other insects as well) and large families may be unstudied, even on a local basis, for decades. There are as yet no modern monographic treatments that can be used for identification of most North American insects, and there are not apt to be for a long time, because most of the work is done by a relatively few individuals, on their own time and without special compensation other than personal gratification. Most are professional biologists, usually college and university teachers, who pursue their research as a side interest in such time as they can spare from teaching or whatever else is their principal means of livelihood. A few are employees on the staffs of museums. A sizeable number are enthusiastic, often very capable amateurs. All require collections in order to work.

Today, most of the specialists build up rather small, highly specialized collections, which they usually deposit in a museum as gifts or bequests. They obtain their study specimens by (1) personally collecting them in the field (the field work usually paid for by themselves), (2) paying professional collectors abroad to secure their special materials for them, (3) borrowing museum specimens or studying them at museums, (4) exchanging with other specialists and with museums.

As stated, the specialist relies heavily upon museums to make available to him the collections of past authors and of unstudied materials that are amassed as a result of expeditions, purchases, etc. Museums get much of their material in the same ways as do the specialists, but on a larger scale, and with the important distinction that they build to a considerable extent upon collections of specialists. They function as trustees in perpetuity of the collections of past specialists, in order to expedite the research of the future.

LINNAEUS SPURRED RESEARCH

The work of Linnaeus gave impetus to a great flush of research in the fields of natural history in the 19th century. The colonial powers, through collectors and naturalists abroad, built great museums in order to house the samples of the fauna and flora which they were eagerly gathering and describing. Interest in natural history became and still is widespread among the literate peoples of these countries. Learned men of means often accumulated large, world-wide, general or specialized collections of great value, sometimes through expeditions of their own. Others have established their own museums. In these activities they were ably assisted by dealers who maintained large staffs of private collectors abroad. These dealers could offer extensive collections of insects that were of value to the specialists. It was only natural that a large percentage of the collections that were formed were of beetles. Beetles are most numerous and relatively easily preserved, are of great variety of form and ornamentation, and the larger ones are relatively easily studied.

In the period of growth of the great collections, the United States was a young growing nation, still relatively immature culturally. In entomology this was reflected by a shortage of people interested in the field. Those who did study insects

found the undescribed fauna of the expanding frontiers more than enough to occupy their energies. Hence, of the relatively few large collections that were formed, most were of United States insects.

Since World War I and, especially, World War II, the United States has undertaken to share or take over many technical commitments and interests in undeveloped countries that were previously almost exclusively the province of European powers. This has been true in systematic entomology too, in part because of the close dependence of many phases of economic and medical entomology upon systematics. Our horizons have broadened, apart from these commitments also. Unfortunately, although United States entomologists have been orienting their interests outwardly for some time, the basic world-wide collections that they need are, with a few notable exceptions, largely lacking. Our largest museum collections are still very small by comparison with those of even the smaller European museums, to say nothing of the British, Paris, Berlin, and Vienna museums.

HUGE COLLECTIONS

The largest museum collection in the United States numbers several million specimens. Several other collections—including those of several of the university museums—number between a million and a half and two million specimens. Chicago Natural History Museum's collection numbers a little more than a million specimens, of which about 600,000—or a little more than their proportional representation in nature—are beetles. In contrast, the British Museum collections total more than 10 million specimens, of which 4 to 5 million are beetles. No exact figure is available for the Paris Museum. Its beetle collection was about the size of that of the British Museum until recently, when Paris acquired the Réné Obertür collection. This fabulous collection alone numbered almost 5 million specimens, most of them beetles. Because of the combination of circumstances that produced the large basic insect-collections in Europe, as well as of certain cultural factors currently at work on the American scene, the insect collections of the principal United States museums can probably never be the equal of those in European museums.

It will be a long time before we will have collections that are comprehensive enough to enable American systematic entomologists to fulfill that part of the world role that is their inheritance. These basic collections cannot be formed as easily as they were in Europe during the 19th and early 20th centuries, but energetic field work and acquisition of collections, when they are available, will help to overcome this lag. Recent acquisitions from abroad of several important beetle collections by Chicago Natural History Museum, the Museum of Comparative Zoology at Harvard, and the U. S. National Museum are steps in this direction.

Technical Publications

The following technical publications were issued recently by the Museum:

Fieldiana: Geology, Vol. 10, No. 26. *Fauna of the Vale and Choza: 12. A New Trematopsid Amphibian from the Vale Formation.* By Everett Claire Olson. 6 pages, 2 illustrations. 15c.

Fieldiana: Geology, Vol. 10, No. 27. *Fauna of the Vale and Choza: 13. Diadectes, Xenacanthus, and Specimens of Uncertain Affinities.* By Everett Claire Olson. 6 pages, 2 illustrations. 15c.

STAFF NOTES

Matthew S. Moroney, a member of the Museum Guard force since September 1, 1952, has been appointed Captain of the Guard to succeed Captain Frank Meinke, who retired in September. Captain Moroney is a native Chicagoan who retired from the Illinois Bell Telephone Company in 1948 after more than 40 years of service . . . . As official delegate of the American Anthropological Association, **Phillip H. Lewis,** Assistant Curator of Primitive Art in the Department of Anthropology, participated last month in a symposium, "The Artist in Tribal Society," at the Royal Anthropological Institute, London, where he presented a paper entitled "The Artist in New Ireland Society." The paper was one of five papers that described activities of primitive artists of various parts of the world, and discussion was directed toward abstracting theoretical knowledge of primitive art . . . . **Loren P. Woods,** Curator of Fishes, left for Trinidad, where he will board the U. S. Fish and Wildlife motor vessel *Oregon* for a four-week exploratory fishing cruise in the offshore waters along the coast of the Guianas and Brazil . . . . **George I. Quimby,** Curator of North American Archaeology and Ethnology, recently returned from a study trip in northeast Wisconsin and upper Michigan, where he examined museum collections and archaeological sites . . . . **Dr. Eugene S. Richardson, Jr.,** Curator of Fossil Invertebrates, last month spoke on "Natural Science as a Career" before a seminar at Lake Forest Academy, Lake Forest, Illinois.

Matthew S. Moroney

ALBERT J. FRANZEN
1901–1957

The Museum regrets to report the death of Albert J. Franzen, Preparator and Taxidermist for the Department of the N. W. Harris Public School Extension of the Museum. He died on October 22 at a Chicago hospital after a lingering illness.

Born June 17, 1901, at Darien, Wisconsin, Mr. Franzen joined the staff of Harris Extension as a taxidermist in 1927, and in 1944 he was appointed Preparator and Taxidermist. He devoted thirty years of faithful service to the Museum before he became ill several months ago. He is survived by his wife, Frieda, and two daughters, Marilyn and Arlene, all of Chicago.

'Wanderland' Is Next Audubon Screen-Tour

"Wanderland," the second screen-tour of the Illinois Audubon Society's 1957–58 season, will be presented at 2:30 o'clock on Sunday afternoon, November 10, in the James Simpson Theatre of the Museum. William H. Wagoner, Jr., lecturer for the National Audubon Society, and his wife, June, will bring to the audience scenes and stories of the wonders of the outdoors—of animal and plant life on mountain peaks, beneath the sea, in the desert, and in jungles, forests, and swamps.

The remaining three Audubon Society screen-tours will be given at the Museum in January, February, and March. All programs are free.

Winter Visiting Hours at the Museum

Winter visiting hours, 9 A.M. to 4 P.M. (5 P.M. on Sundays), went into effect at the Museum on October 15 and will continue in effect until February 28.

Some amazing anatomical structures found in bats are illustrated by models on exhibition in Hall 15.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance including postage are promptly filled.)*

THE EDGE OF APRIL, A Biography of John Burroughs. By Hildegarde Hoyt Swift. William Morrow and Co., New York. 316 pages. 17 full-page wood-cut illustrations by Lynd Ward. Cloth $3.95.

Among a dozen biographies of John Burroughs there is ample room for this new one by Hildegarde Hoyt Swift. Her book is not a critical literary or scientific assessment of Burroughs' work, but it brings the much-loved American naturalist and nature-writer vividly to life. This is accomplished by her sensitive appreciation of his farm-boy background as much as by her enlivenment of the sequence of events by well-imagined dialogue.

The Edge of April will surely drive its readers to search for its life-giving sources in Burroughs' reminiscent and descriptive essays and in his letters and journals. These last were made available by the woman-disciple of his later years, Clara Barrus. Mrs. Swift's emphasis is on the always-more-interesting formative years rather than on the slowly achieved great success or on the overgrowth of a John Burroughs cult (for which Burroughs himself was not to blame). The significant relations of John Burroughs and Walt Whitman are set into clear light. It was vastly to Burroughs' credit that he recognized and championed Whitman's greatness and to his credit that he could be so intimate and so effective a friend to the greater man. Whitman was the subject of his first book and he appears again in his last, more than fifty years later. One could wish that there were more about Myron Benton and John Muir.

The distinguished and patriarchal figure of the bearded John Burroughs was occasionally seen at the American Museum of Natural History during my years there, beginning in 1916. He was always in the company of Miss Barrus, and was welcomed and helped by my own chief, Mary Cynthia Dickerson, editor of our *Journal*, and by our Curator of Education, Clyde Fisher. They could well afford to ignore, as Mrs. Swift has, Burroughs' unfortunate failure to appreciate the professional zoologist. Burroughs was writer rather than scientist, bird-lover rather than ornithologist—which is no derogation of his place in American literature or in American nature-writing. The spirit of his writing is implicit in the fine quotation with which Mrs. Swift brings her book to a close: "The most precious things in life are near at hand, without money and without price. Each of you has the whole wealth of the universe at your very door. All that I ever had, or still have, may be yours by stretching forth your hand and taking it."

It is not the personal overlap of years and the few glimpses of a distinguished figure of a man that brings John Burroughs close to me, and brings me thus to appreciation of the great merit of this latest account of his life. It is the community of the experience of farm work, over years on end—that experience which in America makes one profoundly and distinctively an American. My own farming, fifty years later than that of the New York farmer of the Catskills, was still in the era of the horse-drawn walking plow and included the same experience of land-clearing, of making hay with a scythe, of hand-milking, and of the romance of the sugar-bush. Mrs. Swift, who can scarcely have experienced these elemental farm activities in person, has nevertheless made them vivid. The woods, the farm, and the teaching of country school formed John Burroughs' mind and character.

There is a sensitive portrait, too, of Ursula Burroughs, the wife whose sense of household order her writer-husband never came to appreciate. One may see, in retrospect, that this was his own loss. His failure to transmit to her, as to the members of his own family, his own high appreciation of nature—of Nature with a capital N—was the great failure of his life.

KARL P. SCHMIDT
Curator Emeritus of Zoology

The above review was written by Dr. Schmidt shortly before his death on September 26, 1957

NATURE PHOTO CONTEST ENTRIES INVITED

The time is here to sort the photographs made on last summer's vacation and select those that might qualify for exhibition and perhaps a prize in the next Chicago International Exhibition of Nature Photography.

This exhibition, the thirteenth in the series co-sponsored by the Nature Camera Club of Chicago and the Museum, will be held in February. Prints selected by the judges will be shown in Stanley Field Hall through the entire month, and color slides will be projected on the screen of the James Simpson Theatre on two Sunday afternoons: February 9 and February 16.

The contest is the world's largest in the field of nature photographs exclusively and, in fact, is one of the world's largest of any kind, with or without limitations as to scope of subjects. The deadline for entries is January 13, but early entries are requested to facilitate the task of preparing the many thousands of pictures submitted for judging.

As usual, entries will be in two divisions —prints and color slides. Prints may be either in color or black-and-white.

To be eligible, entries in both the print and slide divisions must qualify under three subclassifications: (1) Animal Life, (2) Plant Life, or (3) General. Scenic views, geological formations, clouds, and other natural phenomena that do not fit into either the animal or plant-life sections will be included in the General classification. In each classification of prints and slides, medals and ribbons will be awarded by the Nature Camera Club of Chicago. In addition, the Photographic Society of America will award special prizes.

Contestants are permitted to submit up to four entries in each division. Photographs should be sent to the Museum. Entry forms containing complete information on the rules may be obtained by request to the Museum.

NEW-WORLD FOOD PLANTS IN NOVEMBER EXHIBIT

A special exhibit, "Food Plants of American Origin," featuring 35 of the most important of America's plant contributions to human diet, will be presented in Stanley Field Hall throughout November.

Centuries before the coming of the white man, the Indians of the Americas were cultivating and/or using many food plants that were then unknown in the eastern hemisphere. Many of these are now used the world over, and some of them, such as corn, potatoes, and cassava, are among man's most important vegetable food-sources. These food plants rival—or even surpass in certain areas—the wheat, rice, and yams of the Old World. The use of other American food plants—for example, oca, ullucu, añu, and quinoa—is still confined more or less to those regions where they were grown at the time of Columbus.

On display for the first time will be several new botanical models made in the Museum's plant-reproduction laboratories: fruiting branches of allspice, parsniplike roots of the arracacha (a vegetable of northwestern South America), tubers of the oca, añu, and ullucu (of importance in areas of the high Andes), fruits of the chayote (widely used as a vegetable in the tropics), several kinds of *Capsicum* peppers (including the fiery tabasco), and examples of the guava (a well-known tropical fruit). The exhibit was prepared by Dr. John W. Thieret, Samuel H. Grove, Jr., and Walter Huebner of the Department of Botany.

The civilization of China from its beginnings in the Old Stone Age (about 500,000 years ago) down to modern times is illustrated by exhibits in George T. and Frances Gaylord Smith Hall (Hall 24) and Hall 32.

CHICAGO NATURAL HISTORY MUSEUM

Bulletin

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Roosevelt Road and Lake Shore Drive, Chicago 5
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Members are requested to inform the Museum promptly of changes of address.

ANNUAL MEETING OF AAA WILL CONVENE HERE

Anthropologists from all over the United States and from several foreign countries will meet in Chicago December 27 through December 30 for the 56th annual meeting of the American Anthropological Association. Meeting jointly with the Association will be the American Folklore Society and the Society for Ethnomusicology. The greater share of the activities will take place at the Palmer House hotel, but a portion of one day will be spent at the Museum where a series of specially planned activities will be presented.

The Museum, Northwestern University, and the University of Chicago are co-sponsoring institutions for the meeting, which is held in Chicago on the average of every six years. The current meeting promises to be the largest in the history of the Anthropological Association. Twenty-three symposia on special subjects from mental health to archaeology and linguistics make up about half of the program. In addition there will be 23 three-hour sessions of volunteered papers on a variety of esoteric subjects such as the construction of the Japanese shoulder drum, religion and killing among the Jívaro Indians of South America, and urban migration in north India.

Several Museum staff members will be participating in the meetings. Dr. Paul S. Martin, Chief Curator of Anthropology, and Curators Donald Collier, George Quimby, and Roland W. Force will serve as discussants for papers presented. Phillip H. Lewis, Assistant Curator of Primitive Art, will present a paper entitled "Meaning in the Study of Primitive Art." Curator Force is chairman of the Local Arrangements Committee for the Anthropological Association and the American Folklore Society.

STAFF NOTES

Albert W. Forslev, Associate Curator of Mineralogy and Petrology in the Department of Geology, last month presented a paper before the annual meetings of the Geological Society of America in Atlantic City, New Jersey. **Dr. Rainer Zangerl,** Curator of Fossil Reptiles, **Dr. Eugene S. Richardson, Jr.,** Curator of Fossil Invertebrates, and **William D. Turnbull,** Assistant Curator of Fossil Mammals, attended meetings of the Society of Vertebrate Paleontology held jointly with the Geological Society meetings. Dr. Zangerl spoke on the Museum's "Mecca" project and Mr. Turnbull reported on recent field work in the Washakie Basin of Wyoming. The three paleontologists also were present at an earlier meeting of the Society of Vertebrate Paleontology held in Philadelphia .... **Dr. Julian A. Steyermark,** Curator of the Phanerogamic Herbarium, recently attended the fourth annual Symposium on Systematics at the Missouri Botanical Garden.

Zoologist Visits

Dr. John Hendrickson, Professor of Zoology at the University of Malaya, Singapore, recently visited the Department of Zoology in connection with his studies on animals of the Malay Peninsula.

THIS MONTH'S COVER

A portion of a carved and painted stela that serves as a focal point in a newly installed diorama in Hall 8 (Ancient and Modern Indians of Mexico and Central America) is shown on this month's cover. The figures represent ancient Maya priests, elaborately garbed. At the top can be seen a few of the calendrical inscriptions that represent the date, September 13, A.D. 795, the end of a "5-tun" period (slightly less than five years). More information about the entire diorama appears on page 3.

MUSEUM AIDS ZOOLOGIST FROM BRITISH GUIANA

Ram Singh, Chief Taxidermist for the British Guiana Museum in Georgetown, British Guiana, will leave the Museum late this month after a three-month study of museum methods and techniques. Mr. Singh, who in his 33 years with the British Guiana Museum has collected, prepared, and installed hundreds of natural-history exhibits, will visit the U. S. National Museum, Washington, D.C., and the American Museum of Natural History in New York City before returning to his home.

Mr. Singh's present visit is a continuation of an eight-month study he made in 1946 to learn modern techniques of taxidermy and exhibition arrangement after a fire in 1945 destroyed the British Guiana Museum's natural-history collections. Since that time extensive collections have been made, exhibits have been installed, and a new building has been erected under the supervision of Director Vincent Roth.

Shortly after his arrival, Mr. Singh was appointed to the Museum's Thomas J. Dee Fellowship, awarded to persons engaged in highly specialized research projects. While here, Mr. Singh has concentrated on methods used in preparing portable school-exhibits in the Department of the N. W. Harris Public School Extension (to augment a similar program in his museum) and the cellulose process used in reproducing reptiles and fishes for exhibition developed by the late Leon L. Walters of this Museum. In addition, he is identifying for the Museum a collection of birds recently received from Colombia. Mr. Singh is one of the ever-increasing numbers of visitors from foreign lands who are taking advantage of the Museum's policy of encouraging staff members of other museums and students in their study of modern museum techniques.

DIORAMA SHOWS COLORFUL MAYA DEDICATION CEREMONY

By DONALD COLLIER
CURATOR OF SOUTH AMERICAN ARCHAEOLOGY AND ETHNOLOGY

THE ANCIENT MAYAS surpassed all other pre-Columbian peoples of the New World as sculptors, mathematicians, and astronomers. These achievements made it appropriate, when we were planning the reinstallation of Hall 8 (Ancient and Modern Indians of Mexico and Central America), to choose as the subject for a Maya diorama the ceremonial dedication of a hieroglyphic monument known as a stela, ornamented with sculptured figures and calendrical inscriptions. This diorama has recently been completed by Dioramist Alfred Lee Rowell and installed.

The scene shown is the plaza of a Maya ceremonial center in the Peten region of Guatemala during the Classic stage of Maya civilization. The time is A.D. 795. In the background are several steep-sided, stepped pyramids surmounted by temples with lofty, brightly painted roof combs. At one side is the newly erected stela, a great limestone slab seventeen feet high on which are carved the figures of elaborately garbed priests.

The date inscribed on the stela (upper right panel) is 9.18.5.0.0 4 Ahau 13 Ceh. This is to be read as follows: "9 periods of 144,000 days (9 bactuns), 18 periods of 7,200 days (18 katuns), 5 periods of 360 days (5 tuns), 0 periods of 20 days (0 uinals), and 0 periods of 1 day (0 kins) have elapsed since the starting day of the calendar (4 Ahau 8 Cumhu) until the present day, 4 Ahau, which is the 13th day of the month Ceh." This day, according to the most widely accepted correlation of the Maya and Christian calendars, is September 13, A.D. 795. The stela has been erected to commemorate the ending of a 5-tun period, that is, the completion of a quarter-katun interval, which is slightly less than five years.

The stela marks the passing of a time-period ending on the day 4 Ahau. Since this day is dedicated to the Chacs, the four celestial rain gods, each associated with a cardinal direction, a rain-making ceremony has been held in conjunction with the dedication of the stela. The four leading priests standing before the stela have just come from this ceremony, in which they have walked barefooted over a bed of live coals while scattering on the embers *balche*, a drink fermented from honey, and copal incense. The head priest is garbed in red, the color of the rain god of the east, and his headdress is adorned with quetzal feathers representing the green of young corn and new leaves. The other three priests are dressed in white, black, and yellow, representing respectively the Chacs of the north, west, and south.

In the procession behind the leading priests are four figures representing the four sky-monsters, deities of rain, crops, and food, who are also associated with the four world-directions. These are two-headed dragons, part lizard, part snake. The monster impersonators in the ceremony are made of bark cloth and feathers, and each is supported by two men whose bodies are concealed within but whose feet can be seen beneath the beast's claws. Their colors, like the colors of the four leading priests, are those of the four directions and their bodies are painted with symbols of the planets and rain.

At the rear of the procession are six assistant priests, also elaborately garbed. They, as well as the leading priests, carry vessels containing offerings to be placed in the pit left open at the base of the stela. They will sacrifice a variety of precious objects, including quetzal feathers, carved jades, eccentrically worked flints, food, *balche*, and cacao beans. At the close of the ceremony the pit will be filled with earth and sealed with stone and mortar.

In the right background is a group of musicians who are accompanying the ceremony. The instruments are trumpets, an

(*Continued on page 8, column 1*)

GIFT OF CHINESE RUBBINGS GOES ON SPECIAL EXHIBITION

By KENNETH STARR
CURATOR OF ASIATIC ARCHAEOLOGY AND ETHNOLOGY

RUBBINGS ARE INK COPIES of low-relief or intaglio (incised) inscriptions and designs on stone, metal, fired clay, and other hard materials. The technique is Chinese in origin, and its use, though found in other parts of the world, has been most common in China and contiguous countries in eastern Asia.

'AZURE DRAGON' STRIKES POSE

Rubbing of a dynamic 'Azure Dragon' taken from a relief cut on a stone coffin found in Chinese tomb of Han period (207 B.C.—A.D. 220).

The East Asiatic anthropological collections of the Museum contain over 4,000 such rubbings that in space represent most of the provinces of China, in time range from the late pre-Christian period to the present century, and in content encompass a wide variety of subjects. Recently this collection was notably enhanced by the addition of over 150 rubbings of early Chinese stone and clay tomb reliefs found in the westernmost part of China. These rubbings, the majority of which date from the Later Han period (A.D. 25–220), together with other anthropological materials from China and Tibet, were presented to the Museum by Dr. David C. Graham, who collected them during his long residence in southwest China as teacher and anthropologist. Many of these rubbings were copied from unique archaeological specimens in the collections of the Ssŭch'uan Provincial Museum, the West China Union University Museum, of which Dr. Graham was curator, and in private collections.

Unlike the situation in the western world, where the practice is uncommon, the production, use, and collection of rubbings has played a significant part in the cultural pattern of China and some of her neighbors. In China particularly, with its strong historical tradition, rubbings long have played an important role in the intellectual life of the country. Following the invention of paper by the Chinese somewhere around A.D. 100 and before the printing of books from wood blocks began, presumably sometime in the eighth century, classic texts for sake of permanency were inscribed on stone, and subsequently rubbings of these texts were made for scholarly use. Though it is quite likely that the practice of taking rubbings of these stone texts occurred earlier, the earliest extant Chinese rubbing dates from somewhere in the years between A.D. 627–649. Although gradually printing from carved wood blocks became the standard method whereby Chinese books were printed, nevertheless the production of copies from stone continued, particularly in the duplication of official texts. In recent centuries the practice of making rubbings has been limited largely to the copying of the inscribed stone pillars (*shih-pei*) that dot the Chinese towns and countryside, marking historical events of local importance. In keeping with their traditional orientations and according to their particular tastes, Chinese scholar-collectors for centuries have collected rubbings of these inscribed pillars, in a manner comparable to that in which prints have been collected in the West; and just as there are prestige factors present in the possession of "first impressions" of prints, so also there is prestige value in the possession of an early copy of a rubbing. Thus, a Ming-period (A.D. 1368–1644) rubbing of a T'ang-period (A.D. 618–907) inscribed monument is prized above one made during the Ch'ing period (A.D. 1644–1911). Lest such desires be charged purely to snobbery, it is well to note the practical fact that the earlier copy generally is sharper and more clear. The making of rubbings long has been a special profession in China, and such craftsmen with their stock of rubbings can be found throughout the country, particularly in the localities that are richest in historic monuments.

TECHNIQUE DESCRIBED

How are these rubbings, or "squeezes" as they sometimes are called, made? Briefly described, the technique used is as follows. A sheet of the proper paper, a variety of "rice paper" (actually, most "rice paper" is made from bamboo pulp), is wetted, often with water to which a little agar-agar has been added for stiffening and adhesive purposes, and the paper is plastered upon the surface from which the rubbing is to be taken. Thereafter the mildly elastic wet paper is tamped down with brushes, care being taken to press the paper into every detail of the surface. A sheet of coarser paper sometimes is laid on top of the actual rubbing paper to protect it in the tamping process. When the rubbing paper has been well pressed into contact with every detail of the surface beneath, the paper is left to dry, the outer protective paper being first stripped away. When the rubbing paper is dry, an inked pad is carefully applied to the high surfaces, and when properly inked the paper is peeled off the surface being copied and is flattened between boards. The technique is an admirable one, for it reproduces quite simply and in full size every detail of the original surface. The "flatness" of the reproduction, in that it fails to communicate the quality of depth inherent in the original surface, in large measure is compensated for by the dramatic effect of black Chinese ink on textured white paper. The technique of making rubbings has served as a sort of camera for many centuries, though rather more cheaply, it may be added. Even today, some Chinese and Japanese scholars carry with them small bundles of materials for making rubbings. The technique is extremely useful, the more so by virtue of the facts that it is inexpensive and immediate. Of importance also is the fact that the object being copied in no way is damaged.

The types of objects whose surfaces are copied by the rubbing technique are limited only by the need for a hard surface upon which there is some relief, either positive or negative. In China rubbings commonly are made from such materials as the following. (1) *Stone pillars.* In keeping with the traditional historical orientations of the Chinese, the materials most copied by the rubbing technique have been the inscriptions cut on stone pillars. The content of these inscriptions is varied in the extreme—classical texts, passages penned by famous calligraphers, accounts of historic events, memorial inscriptions for outstanding local men and women, religious inscriptions, descriptions of public works, and a variety of other subjects of local importance. (2) *Reliefs.* Reliefs, particularly religious and tomb reliefs, are another favorite area wherein the rubbing technique has been employed. The greater portion of the rubbings given by Dr. Graham fall into this category, for they are copies of reliefs found in Han-period tombs, cut out of the natural sandstone in the lower Min River area of Ssŭch'uan Province in west China. The majority of these reliefs are in stone, though many inscriptions and designs, in both low relief and intaglio, derive from clay blocks, molded and fired hard. Descriptions of these tombs, their location, construction, contents, and ornamentation may be found in either of the following two books: (1) Rudolph, Richard, *Han Tomb Art of West China* (1951) and (2) Wên, Yu, *Ssuch'uan Han-tai hua-hsiang hsüan-chi* (1955). Many of the rubbings reproduced in these two books are represented among those given by Dr. Graham while many others in the Graham

collection have not yet been published, a fact that increases their scholarly value. (3) *Miscellaneous.* The rubbing technique is used for copying from a wide variety of other types of subject matter, among which may be mentioned only the most common ones: bronze vessels (texts and designs cast in low relief and intaglio), coins and coin molds, and many other small objects of metal, stone, wood, and bone. As was noted, the copying of textual materials and decorative elements by the rubbing technique has been particularly popular in China by virtue of its simplicity and inexpensiveness, as well as by the effectiveness by which such rubbings can be reproduced for publication.

VALUE OF RUBBINGS

What is the value of rubbings? Relevant to the aims and purposes of the Museum, three reasons may be set down. First, rubbings are of historical value in that copies of inscriptions frequently provide information obtainable in no other printed form. Inscribed on the stone pillars that stand everywhere in China is to be found a vast amount of specific local history that often is not included in the traditional sources. Both the historian and the archaeologist—the latter who is but a historian of the period before the existence of written records—rely upon such information: the historian to supplement the data obtainable in printed sources and the archaeologist that deducible from archaeological materials. Second, rubbings are of value in studying the life and customs of centuries long past. Tomb reliefs such as those represented in the rubbings presented by Dr. Graham provide graphic evidence of many aspects of life in ancient times, for the people of early China recorded variously in the burial complex—on tomb exteriors and interiors and on the burial furniture—many scenes depicting the life of the deceased as well as the religious beliefs and symbolisms of their time. By judicious inference, one can reconstruct some of the aspects of the life of the ancient period, adding the results of these inferences to those acquired from the study of reliefs of similar type and time-period elsewhere, from other relevant archaeological materials, and from available written records. Often, as the Graham rubbings from west China attest, comparative studies are possible. Although the reliefs represented in the western rubbings date from a similar time-period as others in east China and although both groups of reliefs represent a single generalized "Han culture," nevertheless points of difference in matters of style and symbolism occur as between the reliefs of the two regions, a condition attributable to the fact that the west China reliefs presumably were influenced by the non-Chinese T'ai culture, which played a major part in the history of the Ssŭch'uan region well up into the post-Han period. Third, many rubbings, apart from their basic historico-cultural significance, are objects of aesthetic interest, exciting our sensitivities by virtue of their artistic excellence, whether the original subject be a classic poem composed by a famous poet and penned with the Chinese brush by an outstanding calligrapher or whether it be some finely executed motif. The historical, cultural, and aesthetic significance of the rubbings housed in public and private collections throughout the world becomes even greater when one considers the fact that the monuments from which they were taken in many cases no longer exist, having fallen prey to the destructive forces of nature and man.

PARTY SCENE—SECOND CENTURY STYLE

Active party scene shows seated man and woman (upper left), two jugglers (upper right), two musicians (lower left), and an acrobat or musician and dancing woman (lower right). Rubbing depicts aspects of life in second century in west China where original molded clay relief was found.

A showing of selected examples of the rubbings given by Dr. Graham and representing scenes depicted on stone and clay in the Han-period rock tombs of southwestern China is being made in Stanley Field Hall during the seven-week period beginning December 1 and continuing through January 19, 1958. The 50 rubbings included in the special exhibit have been grouped to illustrate some of the aspects of life in west China during the Han period (207 B.C.–A.D. 220). These groups are as follows: social activities; economic activities; horses and chariots, gates and towers (military scenes); animals and humans—real and imaginary; miscellaneous; tomb bricks—geometric designs and brief inscriptions.

NEW MEMBERS

The following new Members were elected from October 16 to November 15:

Contributors

Dr. David C. Graham
Stewart J. Walpole*

Sustaining Member

Allen C. Michaels

Annual Members

Edward F. Anixter, William J. Aste, Walter H. Baumgartner, Theodore C. Beug, Miss Carolyn Eloise Carey, Donald Coleman, William B. Cudahy, Mrs. George E. Dolezal, Dr. John G. Ersfeld, Clifford T. Fay, Jr., C. V. Felker, Burleigh B. Gardner, F. Sewall Gardner, Bruce J. Graham, Robert V. Guelich, D. S. Haigh, Walter L. Hedin, Mrs. Wilmarth Ickes, William W. Joyce, James S. Kemper, Lorenz F. Koerber, Jr., Benjamin C. Korschot, John T. Landreth, Glenn E. Martin, Miss Christine Mathis, Hugh J. O'Connor, Robert E. O'Hanlon, Dr. Raymond J. Pellicore, M. F. Peterson, Marvin E. Pritikin, Miss Lillian F. Reid, Earl K. Riley, Robert George Schmidt, Phil Shorr, Charles F. Short, Jr., Ezra Solomon, Kenneth M. Wiggins

* Deceased

Children's Activities . .

ANIMALS IN WINTERTIME TOPIC FOR DECEMBER

The problems that confront animals in winter will be pointed out to boys and girls who attend the Museum alone or in school or other organized groups during December when three activities are offered by the Raymond Foundation, children's educational organization.

"Animals in Winter," the 12th Journey for children given by the Museum, will show how animals accustom themselves to the rigors of winter by changing color, changing diet, hibernating, or migrating to more temperate climates. Any boy or girl who can read is eligible to participate during Museum visiting hours (9 A.M. to 4 P.M.). Instruction sheets will be available at both the north and south doors of the Museum. When a child has visited the various animals on exhibit and has answered all the questions on his Journey sheet, he can deposit the sheet in a barrel provided at either Museum entrance. If all the questions have been answered correctly the youngster is on the way to becoming a Museum Traveler which requires four different successfully-completed Journeys. Eight Journeys qualify him as a Museum Adventurer and 12 Journeys as a Museum Explorer. Boys and girls winning these honors will receive a special award from Dr. Clifford C. Gregg, Museum Director. The winter journey will continue through January.

"Christmas for the Birds," a special program for elementary-school children (from grades one through four) offered from December 2 through 6, will furnish ideas for giving Christmas presents to birds in the Chicago area. The program will include a film and Museum tour of birds found in the Chicago region during the winter. Highlighting the activity will be a demonstration-exhibit on how to trim the family's discarded Christmas tree with a yule banquet including dried fruit, seed, popcorn, raisins, and other delicacies fancied by birds.

A third program, "How Living Things Survive Weather Changes," now in progress, illustrates, through the use of a special tree exhibit (see picture, left), how animals and plants prepare for changes in season, with a timely emphasis on winter. A tour of Museum exhibits pertinent to the subject follows for the elementary-school children participating.

AND IN THIS CORNER...

Maryl André, Raymond Foundation lecturer, reveals two raccoons peeking out from tree specially made for school program on adjustment of animals and plants to changing seasons. Concealed in tree are woodchuck, rabbit, and others.

TRAVELERS AND ADVENTURERS POSE

These cheerful-looking youngsters are Museum Travelers and Museum Adventurers who last month received awards from Dr. Clifford C. Gregg, Director, for successfully completing four Museum Journeys (Travelers) or eight Museum Journeys (Adventurers). Awards were presented to the children by John R. Millar, Deputy Director. Travelers are (top row): Ronald Bonneau, Carol Conell, Marcia Borla, Mary Rose Vallely, Patricia Redmond, Kendrick Bisset, Susan Lewis, Donna Tapper, and David and Richard Greb, all of Chicago. Adventurers are (bottom row): Sarah Strandjord, Ronald and James Molnar, Miriam and David Petty, Joan Tapper, David Strandjord, and Jeanne Marie Hansen, all of Chicago, and Afan Chill, of Oak Park. Jimmy Dimitelous, of Bountiful, Utah (formerly of Chicago), and Timothy Gorman and George Rocourt, both of Chicago, were not present to receive their awards.

4-H Club Delegates To Visit Museum

More than 1,200 boys and girls, official delegates of the 36th National 4-H Club Congress held annually in Chicago in conjunction with the International Livestock Exposition, will tour the Museum on December 3.

The delegates, who come from all parts of the United States and several foreign countries, are continuing this year their annual practice of visiting the Museum during their stay in Chicago.

Examples of more than a hundred families of mollusks are exhibited in Hall M.

GIFTS TO THE MUSEUM

Following is a list of the principal gifts received during the past month:

Department of Anthropology:

From: Dr. David C. Graham, Englewood, Colo.—Chinese rubbings, wood-block prints, and loose pages from Tibetan books

Department of Botany:

From: Karl E. Bartel, Blue Island, Ill.—9 plant specimens; Dr. M. R. Birdsey, Coral Gables, Fla.—photostat of *Arum tripartitum* and *Philodendron fenzlii*, Mexico; Albert Dickenson Co., Chicago—*Pennisetum glaucum*, Tennessee; Hershey Chocolate Corp., Hershey, Pa.—cocoa beans and other samples; E. J. Palmer, Webb City, Mo.—7 plant specimens; Mrs. L. H. Wait, Miami, Fla.—*Heteropteris Beecheyana*

Department of Geology:

From: Glenn Boas, Chicago—Arthropleura

Department of Zoology:

From: University of California, Los Angeles—977 fishes; Dr. Carl J. Drake, Washington, D.C.—2 water-strider bugs, Florida; Effingham County Farm Bureau, Effingham, Ill.—2 slugs; Rodolfo Escalante, Montevideo, Uruguay—birdskin; Dr. Dorothea Franzen, Bloomington, Ill.—44 non-marine shells, Minnesota; Prof. R. Wheeler Haines, Baghdad, Iraq—wild pig; Leslie Hubricht, Louisville, Ky.—collection of fresh-water clams; Dr. P. Kirtisinghe, Colombo, Ceylon—15 frogs; Maj. R. E. Pasho, San Francisco—frog, lizard, Borneo; Eugene Ray, Morton Grove, Ill.—32 beetles; Allyn G. Smith, San Francisco—2 land snails, Idaho

SACRED MUSHROOMS INSPIRE MEDICAL RESEARCH

By DR. ROLF SINGER

CHAIRMAN, DEPARTMENT OF BOTANY
INSTITUTO MIGUEL LILLO, TUCUMAN, ARGENTINA

IT HAS BEEN NO SECRET during the last four centuries that the Mexican Indians, particularly the ancient Aztecs and Mayas, used mushrooms as narcotics and that they had hallucinations during their narcotic states. This fact was used by the priests to make it appear that the visions of the mushroom-eater were divine revelations, attributed to a number of the heathen gods of pre-Columbian Mexico. It is also known that this knowledge continues with the present-day tribes of Mexican Indians, particularly with the Mazatec, Zapotec, and other Indians of southern Mexico and even in regions quite close to Mexico City, although there the ceremonies are held secretly in the houses of the curanderos (healers) under the pretense that they will provide cures for a large number of diseases.

However, the nature of the mushrooms involved was a secret to be disclosed by mycologists, the mushroom specialists among botanists. For there was a school of thought, as late as in the thirties, assuming that what the Spanish conquistadores had reported as mushrooms were actually cacti—the same cacti that are still used for comparable hallucinatory effect, peyotl (*Lophophora williamsii*). Then an American botanist, Richard Evans Schultes, brought some specimens to Harvard University, proving that what the Aztecs called *teonanácatl* (the sacred mushroom) actually *was* a mushroom. One of the species brought to Harvard was later proved to be inactive, i.e., not producing hallucinations in the sense described. The other specimen, however, was identified as *Psilocybe cubensis* by the writer, then mycologist at Harvard University. This mushroom grows on dung throughout the warm zones of the world and is remarkable because it has a ring-like structure on its stem (like the commercial white mushroom) and turns blue where scratched (because of the presence of an enzyme causing the oxidation of a colorless substance whereby it forms a melanin-like pigment, related to the one responsible for the color of human hair). San Isidro, the Mexican name of this mushroom, establishes again the relation with religion (Roman Catholic). The Mazatec Indians of the state of Oaxaca, living far away from civilization, continue eating this mushroom, six or eight fruiting bodies at a session, in order to get "where God lives," i.e., in a state of euphoria and colorful visions.

Since then two mycologists have gone to Mexico to study these mushrooms on the spot and obtain pure test-tube cultures in order to grow them in mushroom houses or industrially at home. Both Roger Heim, Director of the Museum of Natural History, Paris, and the writer have found that the San Isidro mushroom is not the only one eaten. Actually several species are eaten in various parts of Mexico, but all belong to the same taxonomic group, a section of the genus *Psilocybe*. They turned out to be either of worldwide distribution, like San Isidro, or from a more restricted area in America, like the so-called landslide mushroom (*Psilocybe caerulescens*), which was in fact discovered years ago in Alabama and called "birdies" by the Indians because they made one sing happily, and like *Psilocybe mexicana*, which grows in Mexico and Guatemala. Others were found only in a single region and were new to science.

SACRED MUSHROOMS

Representing one of several kinds of sacred mushrooms, specimens above (Psilocybe Aztecorum Heim) were collected at Paso de Cortes, Mexico.

Why was there such a sudden outburst of activity in behalf of investigations into the subject of hallucinogenic mushrooms? There are several reasons. In the first place, as in so many cases, the time was ripe and our knowledge sufficiently widened during an intensive study of the anatomy and distribution of all fungi, especially of the mushroom-like "agarics" and "boletes," that it was now possible to tackle this difficult problem from the mycological side. Furthermore, a New York banker, Mr. R. Gordon Wasson, had become interested in the anthropological aspect and the folkloric role that these mushrooms have in Mexico and elsewhere in the world. He was so enthusiastic about his discoveries during several trips to Mexico that he published well-illustrated articles in several American and foreign magazines and, in addition, wrote a two-volume book on *Mushrooms, Russia, and History*. Finally, and this is perhaps the strongest incentive in our practical world that will not cease asking "what is all this *good* for?"—there is hope that the hallucinogenic principle in the mushrooms can be isolated and applied in medicine. We do not know precisely in which form this substance (or these substances) may be useful. Some believe that it may give us a better understanding of such mental disorders as schizophrenia, others think that it may become a new and better tranquilizer drug, and others believe that it might be directly applied to the mentally ill in a completely new approach to neuropsychiatric treatment.

Nothing is known thus far beyond the private observations of those who have eaten the mushrooms up in the mountains of Mexico in a weird surrounding and in a strange state of well-being and beauty in the midst of some of the oldest superstitions of this planet. Nevertheless, research is being driven far beyond the botanical aspect of the mushrooms, and while this is written several laboratories are busy with animal tests, chemical extractions, and analyses, and the scene is being made ready for the first tentative application in hospitals. A new wonder drug? Maybe, and maybe not, but most certainly one of the most intriguing and inspiring researches of our time, and well worth the curiosity demonstrated by scientists of all specialities.

A special exhibit in Chicago Natural History Museum's Stanley Field Hall from December 13 through January 19 will show models of the more common species used, as well as dried mushrooms and the test-tube cultures as obtained in a Mazatec Indian village in Oaxaca. Some kinds produce little mushrooms right inside the tube, others in order to fruit must be grown in a special mushroom house. The various species in dried condition are still useful and have not lost any of their hallucinogenic properties. They are soaked in water and eaten raw. Their taste is astringent and disagreeable.

SPECIAL EXHIBIT

Samuel H. Grove, Jr., Artist-Preparator for the Department of Botany, discusses November special exhibit, "New World Food Plants," with two interested onlookers, Steve Kelemen and Esther Dycus, both of Griffith, Indiana.

MAYA DIORAMA—

(*Continued from page 3*)

upright drum with skin head, and gourd rattles. To the left and facing the musicians is a group of spectators, the head chief and his entourage. The chief is the leading figure in this group, with a jaguar skin around his waist and a fan of feathers in his hand. Two of his followers are holding feather parasols with long handles.

The style of the figures in this diorama is not realistic. It is based on the Maya style of low-relief carving on stone monuments and was adapted by Mr. Rowell to the requirements of the diorama. This approach has given the diorama a pleasing and unique character that the ancient Maya sculptors themselves would have understood and appreciated.

The content of the ceremony—the costumes, coloring, symbolism, and musical instruments—is based on Classic Maya carvings and especially on the remarkable murals discovered by Giles G. Healy in 1946 at Bonampak, a small Maya city in Chiapas near the border of Guatemala. These brilliantly colored paintings, which completely cover the walls and ceilings of three rooms in a small temple, deal with ceremonies and warfare. They were painted about A.D. 800. The stela in the diorama is based on Stela 2 at Bonampak; the inscribed date has been changed to a date suitable for the ceremony depicted in the diorama.

In planning and executing this diorama we have had the benefit of the help and advice of J. Eric Thompson, Research Associate in Central American Archaeology, who was formerly a curator at the Museum and is a leading authority on Maya epigraphy and archaeology. Mr. Healy, a well-known photographer, generously donated enlargements of his fine photographs of Stela 2 at Bonampak for the use of Mr. Rowell in carving the model stela in the diorama.

Museum Will Close On Both Holidays

To enable its employees to enjoy the season's holidays with their families, the Museum will be closed on Christmas and on New Year's Day. These are the only two days in the year when the Museum is not open to visitors.

Daily Guide-Lectures

"Highlights of the Exhibits," free guide-lecture tours designed to give a general idea of the entire Museum and its scope of activities, are available Monday through Friday at 2 P.M. and Saturday at 2:30 P.M. No tours are offered on Sundays.

CHRISTMAS SHOPPING? TRY THE MUSEUM

Christmas shopping—the easy way—is offered by The Museum Book Shop. No crowds to battle, no packages to wrap. In fact, you need not leave your home. The Book Shop handles orders by mail or telephone (WA 2-9410) and all details of wrapping and mailing gift purchases.

Besides a fine selection of books for both adults and children, all endorsed by members of the Museum's scientific staff, The Book Shop has unusual art objects, novelties, and toys for juvenile collectors.

A distinctive gift is the hand-carved mask shown at left. Its grotesque impressiveness is enhanced by vivid colors.

Hand-carved birds in a variety of shapes and sizes are at right. They are handicraft from India, cut and polished from water-buffalo horns, and are mounted on solid rosewood bases.

Salad-set, below, is made in Kenya, East Africa. Each ornamental piece is 14 inches long.

So lifelike you can almost see it wriggle is hand-carved fish from Bali, below.

NATURE PHOTO CONTEST JUDGES ARE CHOSEN

Five judges have been chosen to select the winning entries for the Thirteenth Chicago International Exhibition of Nature Photography to be held at the Museum in February. They are: Mrs. Anne Pilger Dewey and Edward Kloubec, Jr., photographers, of Chicago; Ramon Swisher, of Willow Springs, Illinois, a biology instructor at Wilson Junior College, Chicago; and two Museum staff members, Phillip H. Lewis, of Chicago, Assistant Curator of Primitive Art for the Department of Anthropology, and Dr. G. Alan Solem, of Oak Park, Illinois, Assistant Curator of Lower Invertebrates for the Department of Zoology.

Prints selected by the judges will be shown in Stanley Field Hall from February 1 to February 23. Color slides will be projected on the screen of James Simpson Theatre on two Sunday afternoons—February 9 and February 16. Although the deadline for entries is January 11, early entries are requested to facilitate the task of processing the thousands of pictures submitted for judging.

The contest has two divisions: prints and color slides. Prints may be either in color or in black-and-white. Entries in both the print and slide divisions must qualify under three classifications: (1) Animal Life (excluding domestic animals), (2) Plant Life, such as trees, shrubs, fungi, flowers (no formal arrangements), or (3) General (any natural-history subject not included in the above classifications, such as clouds, landscapes, or ancient ruins).

In each classification of prints and slides, medals and ribbons will be awarded by the Nature Camera Club of Chicago. Special prizes will be awarded by the Photographic Society of America. Contestants are permitted to submit not more than four entries in each division. All entries will be returned prepaid to their owners immediately after the close of the exhibition or forwarded to any other exhibition indicated. Entry forms with complete information on the rules of the contest may be obtained from the Museum.

More than two-thirds of recorded meteorite falls are represented in the Museum's collection in Clarence Buckingham Hall (Hall 35).

GIFT MEMBERSHIP

An ideal suggestion for Christmas gift-giving is a Museum Membership. Full particulars of the Membership gift plan are given in a separate leaflet enclosed with this "Bulletin."

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